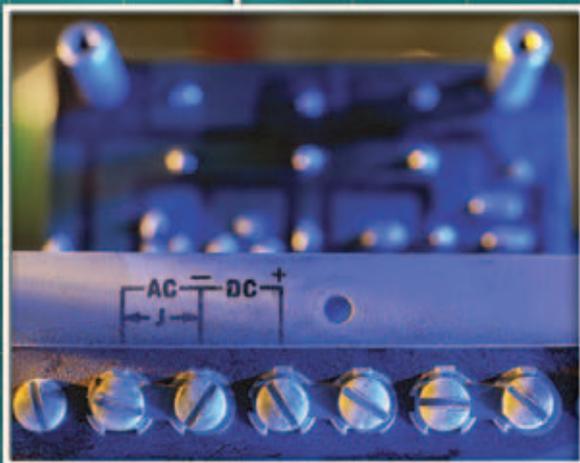
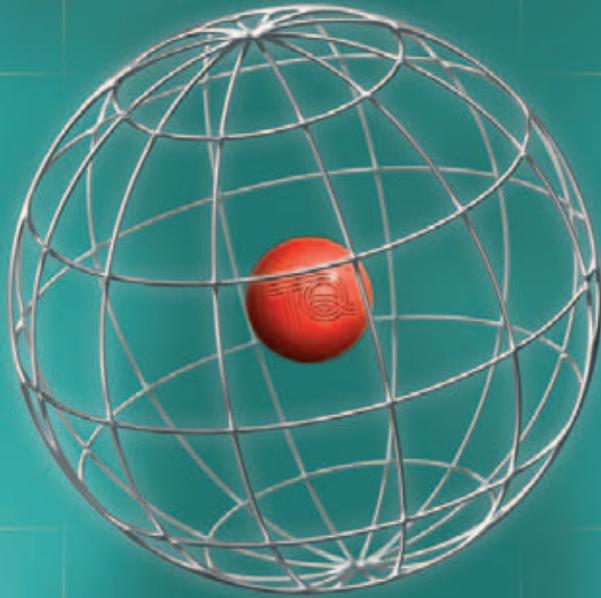


Electrical Machines Technology and Electrical Power Systems



TQ Education and Training Ltd

Integrated Learning Solutions



Advancing human development through education and training

TQ is a leading manufacturer and provider of technical equipment, education services and project management to schools, colleges, universities and industrial training facilities worldwide.

With almost fifty years of unrivalled experience in education we are able to provide solutions to our customers which specifically address their training requirements.

Established in 1958 in Nottingham, England, TQ is an ISO 9001 accredited company and an Investor in People.

TQ Products

Academic

- Aerodynamics
- Fluid Mechanics
- Structures
- Materials Testing and Properties
- Theory of Machines
- Thermodynamics
- Electrical Engineering Principles
- Electrical Machines Technology**
- Electrical Power Systems**
- Control Engineering, Sensors and Instrumentation
- Modular Energy Laboratory

Vocational

- Technology and Science Kits
- Electricity and Electronics
- Automotive Engineering
- Mobile Technology Teaching Laboratory
- Online Learning

Electrical Machines Technology and Power Systems

Electrical engineering courses benefit immensely from practical experimentation. It lets students see theory in practice, enhancing the learning experience and reinforcing knowledge obtained from lectures. Sometimes, because of the scale, nature or cost of electrical training products, students have not always been given the opportunity to use genuinely comprehensive, representative equipment for hands-on experiments.

The TQ **Electrical Machines Technology** and **Electrical Power Systems** ranges give truly unique and comprehensive laboratory support for lecture room delivered theory. It includes unmatched, world-class products specially designed to provide cost-effective, realistic and highly productive teaching.

For maximum teaching value, laboratory equipment needs to reproduce real-life characteristics. These products are completely realistic. All equipment is representative of full-scale industrial systems. The expert designs ensure students get the highest quality practical experience possible.



When you invest in equipment like this, you'll want to make the best use of it. Every product has extensive teaching materials for safety, operation, experimental work and maintenance. The documentation, as well as the products themselves, has been developed working with expert educationalists and electrical power systems engineers with years of experience and thorough subject understanding.

As a professional educator, you need the support of professional teaching equipment. The support this exceptional equipment will give your teaching is unmatched.

Electrical Machines Teaching System

TQ's Electrical Machines Teaching System is a highly popular, established and comprehensive modular teaching system for a complete range of practical investigations into electrical machines, their operation, characteristics and applications.



For all academic levels, the modular nature of the teaching system enables electrical machines laboratories to be economically set up and extended as necessary to fulfil developing needs.

The compact, lightweight design enables quick and easy installation, and experiment manuals cover each aspect of the range. Power electronic drives enable investigations into thyristor speed control of d.c. motors, stepper motors and drives, and variable frequency inverters, and the range

includes computer interfaces for data logging and open/closed-loop control. Clear diagrams on the apparatus help students understand experiments, and high levels of in-built safety mean students can use the equipment with minimal supervision.

Manufactured to extremely high quality standards, the hard-wearing, robust designs withstand many years of continual student use.

The Electrical Machines Teaching System is made up of the following units:

Test Bed

Provides power supplies and other essential services, as well as providing full support for machines under test. The Test Bed includes an integral eddy current dynamometer, with variable power supply with speed and torque displays. It also has facilities for monitoring and control by external instruments.

The equipment is robust and hard-wearing. Combining this with high levels of safety means it is ideal for use by students on their own or in groups, or for class demonstrations. Minimal installation and commissioning are required, and the test bed is ergonomically designed to fit on a workbench or desk.



Test Bed

FH2

Instrumentation Frame

A support frame which holds instrumentation and control modules from TQ's Electrical Machines Teaching System. Usually placed over the rear of the Test Bed, it provides easy access and support for all rack-mounting instrumentation and control modules. It also provides a convenient storage facility for modules not in use.

The lightweight, portable frame is strong and sturdy to withstand many years of student use. It also includes an earth connection for safety.

Instrumentation Frame

FH3

Electrical Machines

A wide selection of interchangeable, industrial-type electrical machines for educational use. The selection includes d.c., a.c., single-phase and three-phase motors and generators which give operating characteristics typical of their type. Ideal for supporting classroom-taught theory, each machine fits conveniently on to the Test Bed using a simple, fast alignment procedure. Each machine includes an overlay panel showing winding details. All the machines have similar frame sizes, which enables meaningful comparison between different machine type operating characteristics.

Fully compatible with all other products in the Electrical Machines Teaching System, the machines include high levels of built-in safety including an integral earth interlock.



D.C. Compound Machine	FH50
Shaded Pole Motor	FH60
Split Phase Motor	FH70
Capacitor Motor	FH80
Cage Rotor Induction Motor	FH90
Wound Rotor Machine	FH100
A.C. Series Motor	FH110
Two-Speed Induction Motor	FH130
Synchronous Reluctance Motor	FH140
Stepper Motor	FH150

Transformer Module

A single-phase, double-wound transformer held in a robust enclosure. The multiple primary and secondary windings and tappings allow students to investigate a wide range of transformer principles, including Scott Connection. Three units may be interconnected to enable three-phase transformer experiments.

Transformer Module	TR1
--------------------	------------

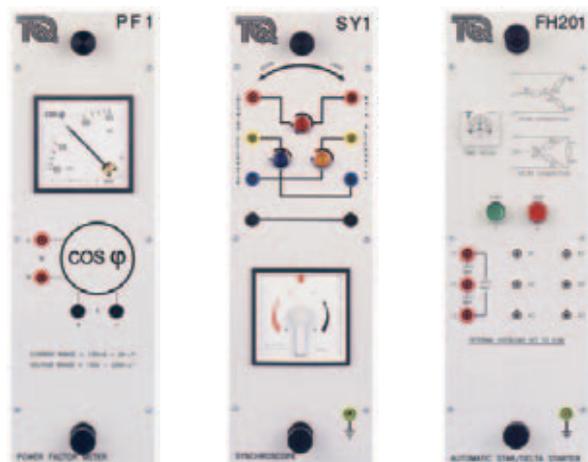
Variable Transformer

For investigations into single-phase variable transformer operation. Housed in a rugged enclosure which fits on to an Instrumentation Frame. By connecting three of these modules together, students can also investigate three-phase operation.

Variable Transformer	VTM1
----------------------	-------------

Instrumentation and Control Modules

A comprehensive selection of quality instrumentation, loading and control modules provides everything needed to complete a full and comprehensive range of test circuits for each electrical machine. Supplied in hardwearing, rugged enclosures, the modules conveniently mount on the Instrumentation Frame. All indicators, controls and sockets are ergonomically positioned, easy to read and adjust. Where appropriate, diagrammatic representations on the front panels of the modules aid student understanding of the circuits. The modules include appropriate safety and protection, such as overcurrent, voltage or thermal cut-outs.



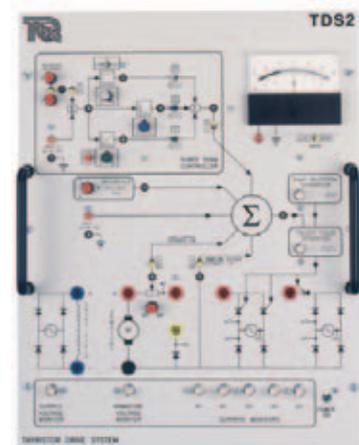
D.C. Ammeter	A2
A.C. Ammeter	A3
Triple A.C. Ammeter	A30
D.C. Voltmeter	V2
Triple A.C. Voltmeter	V3
Wattmeter	W1
Speed and Slip Indicator	S1
Frequency Meter	F1
Power Factor Meter	PF1
Synchroscope	SY1
Synchronising Panel	SY2
Resistive Load Bank	R1
Rheostat	R2
Three-Phase Resistive Load Bank	R3L
Capacitive Load Bank	C1
Inductive Load Bank	L10
Direct On Line Starter	FH200
Remote Control Unit	FH200/R
Automatic Star Delta Starter	FH201
Auto-Transformer Starter	FH202
Utility Switch	FH203
Resistive Load Bank	R5L
Variable Transformer	VTM1
Automatic Speed Controller	FH210
Transformer Module	TR1

Thyristor Drive System

A frame-mounting module for use with TQ's Electrical Machines Teaching System to enable investigations into thyristors controlling the speed of a d.c. motor. This is under various open and closed-circuit conditions and with different sources of feedback. These include studies of open and closed-loop control using armature voltage, variable armature current and tachogenerator feedback. The equipment includes inputs for external controller signals, monitoring points for power rated voltage and current signal waveforms. It also includes a built-in meter for control signal monitoring.

Thyristor Drive System

TDS2



Variable Frequency Inverter

Illustrates the principles and operation of variable frequency and speed control of a cage rotor induction motor using a pulse width modulated (PWM) three-phase inverter. Fully compatible with equipment in the TQ Electrical Machines Teaching System range, the apparatus consists of a self-contained pulse width modulated variable frequency inverter. It enables internal and external control of frequency and speed, acceleration and deceleration, and direction of rotation. The bench-mounting unit has fully buffered frequency and voltage monitoring points for safe monitoring and display by oscilloscope. A meter is included to display speed, slip and frequency.

Variable Frequency Inverter

MPM1015



Stepper Motor Drive System

Fits on to an Instrumentation Frame for studying the stepping and dynamic characteristics of a stepper motor and drive configuration. Enables students to use standard industrial techniques to obtain speed and positional control. Includes inputs for variable analogue d.c. and digital signals for external control of speed, acceleration and position. For use with TQ's Electrical Machines Teaching System.

Stepper Motor Drive System

SMS2

Supply Converter Unit

A transformer unit to provide the 230 volts line voltage required by the Test Bed. Can supply up to three test beds from a three-phase mains supply.

Supply Converter Unit

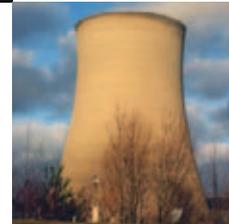
MPM1004

Electrical Power Systems

The teaching strategy of TQ's Electrical Power Systems range is to introduce the student to power system engineering by giving a thorough understanding of the individual elements of a power system. A selection of equipment is available to cover each of the relevant elements, allowing students to investigate an extensive variety of behaviour. This includes problem solving and analysis, as each product can accept a wide range of faults.

The products available cover every aspect of power systems: generation, transformation, transmission, distribution, utilisation and protection. The range is completed by total system study on the award-winning Power System Simulator.

Alternatively, all major products are available in modular form, and can be linked together using the Switched Busbar Module. This option allows education or training institutions to gradually build up



laboratories and combine individual power system components until they have a full laboratory simulation of a typical industrial power system.

TQ's Electrical Power Systems products make it simple for educational institutions to set up a complete power systems engineering course in a short time and in a cost-effective way. Our experts can help you determine the configuration that's right for your course and your environment.



Thyristor and Diode Teaching Unit

Even for electrical engineers who do not specialise in power electronics, knowledge of the properties and circuitry of power semiconductor devices is of paramount importance. TQ's Thyristor and Diode Teaching Unit is a versatile teaching aid which provides all the facilities needed to investigate the principles and applications of thyristors, diodes and converters. The scope of experimentation ranges from investigating the operating characteristics of individual devices, through to their use in basic and advanced power electronic drives. A wide range of a.c. and d.c. experiments is possible, as is single-phase and three-phase operation.

The equipment consists of a floor-standing, self-contained mobile console. All components, transformers, instrumentation, power supplies and control devices are mounted on the control panel of the console. A mimic diagram details the connection requirements.

Thyristor and Diode Teaching Unit	NE9023
Portable Resistive Loadbank	NE7026
Portable Inductive Loadbank	NE7028
Analogue/Digital Oscilloscope	OS2

Educational Transformer

For comprehensive investigations into the principles and operating characteristics of single-phase and three-phase power and distribution transformers. This ergonomic teaching console enables a wide range of experiments and investigations into transformer operation and applications.

The apparatus contains one three-phase double-wound transformer and three single-phase triple-wound transformers with tertiary windings. The console has full instrumentation including a numerical protection relay with a wide range of functions. Parallel operation experiments are simplified and the transformers have a wide range of winding tapplings and winding pairs. A variable auto transformer is also included.

Educational Transformer	NE9240
Portable Resistive Loadbank	NE7026
Portable Capacitive Loadbank	NE7027
Portable Inductive Loadbank	NE7028



Three-Phase Mobile Educational Transformer

A mobile 3 kVA, three-phase, multi-tapped transformer. As well as general laboratory use, the open and flexible design of the equipment makes it suitable for a wide variety of single-phase or three-phase experiments. The design makes it easy to demonstrate transformer principles in single-phase or three-phase delta or star configuration. All tapplings are connected to colour-coded shrouded sockets for safety.

Students can measure core and winding temperature, and multiple tapplings and extra (tertiary) windings enable a variety of output voltages.



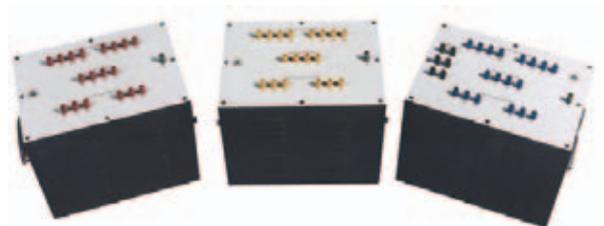
Three-Phase Mobile Educational Transformer	NE9042
Portable Resistive Loadbank	NE7026
Portable Capacitive Loadbank	NE7027
Portable Inductive Loadbank	NE7028

Single-Phase Transformers

A set of three single-phase, multi-tapped transformers for a wide range of single-phase or three-phase experiments.

The apparatus consists of three separate transformers, each fitted inside a robust enclosure. Each transformer has a selection of high-voltage (primary) and low-voltage (secondary) windings to select a range of output voltages. The open, flexible design allows students to use the transformers for many different types of experiment.

All tapplings are accessible so that the transformers may be configured for delta or star connection. All tapplings are connected to colour-coded, shrouded sockets for safety. To make transformer principles easy to demonstrate, the transformers operate at one volt per turn. This means that the output (no load) voltage corresponds exactly to the number of turns. The transformers also enable students to measure the temperatures of the primary windings, the secondary windings and the core of the blue-phase transformer.



Single-Phase Transformers	NE9043
Portable Resistive Loadbank	NE7026
Portable Capacitive Loadbank	NE7027
Portable Inductive Loadbank	NE7028

Salient Pole Generator

Allows comprehensive investigations into the principles and operating characteristics of salient pole generators. The floor-standing educational console includes a fully instrumented salient pole generator with facilities to allow no-load tests and synchronising and parallelling with three-phase supplies. When used with external load banks (available separately), the equipment also allows full-load generator tests, load sharing, protective relaying, short circuit and zero-power factor tests.

The base of the console houses the generator and prime-mover. The steady state and transient performance characteristics of the motor and generator combination are typical of industrial turbine and generator sets. This allows meaningful generator investigations, including studies into performance envelope stability limits.

The equipment has comprehensive instrumentation and controls, plus a numerical protection relay for investigations into a wide range of protective functions and analysis.

The console includes a detailed mimic diagram and clear labelling to help student understanding. It also has a convenient work surface.

TQ's Salient Pole Generator can easily be incorporated into a modular power system using a Switched Busbar Module (NE9200, available separately).



Salient Pole Generator	NE9250
Portable Resistive Loadbank	NE7026
Portable Capacitive Loadbank	NE7027
Portable Inductive Loadbank	NE7028



Transmission Line Simulator

For comprehensive investigations into short, medium and long transmission line performance, including the characteristics of single-phase and three-phase systems. The Transmission Line Simulator enables realistic studies under variable load and power factor conditions, as well as with inserted faults. The equipment also enables effective demonstrations of the "Pi" or "Tee" methods of loss profiling.

The floor-standing teaching console includes all essential instrumentation, power supplies, loads, controls and protection devices. A fault application switch and earth fault resistors allow studies of earth fault currents and the operation of relays of varying sensitivity. In addition, a numerical protection relay provides a wide range of functions.

The console has a convenient work surface for student use during experiments, and a detailed mimic diagram with clear labelling helps student understanding. The Transmission Line Simulator can easily be incorporated into a modular power system, using a Switched Busbar Module (NE9200).

Transmission Line Simulator	NE9280
Power Factor Loadbank and Static Compensator	NE9060

Switched Busbar Module

TQ's Electrical Power System range consists of products to allow students to investigate the principles associated with all elements of a typical electrical power system. These include generation, transformation, transmission, distribution, utilisation and protection. Once students fully understand the principles associated with each of these elements, they can advance to more complex electrical power systems. These include combinations of two or more of these elements.

TQ's Switched Busbar Module cost-effectively interconnects products from TQ's Electrical Power Systems range, allowing investigations into more complex electrical power systems. The Switched Busbar Module is a versatile, safe and cost-effective laboratory solution to support a complete course in electrical power system training, theory and practice. It interconnects products in TQ's Electrical Power Systems range in a realistic and meaningful way, producing circuits with characteristics typical of industrial electrical power systems.

The Switched Busbar Module can be hard-wired to two or more TQ Power System modules. These are the Salient Pole Generator, Educational Transformer, A.C. Transmission Line Simulator and Distribution Trainer.

Students use the individual products for practical experiments in the topics involved. Using the same equipment, linked by a Switched Busbar Module, minimises the difficult transition from fundamental principles to studies of more complex systems.

Students observe the effects on overall system performance and also the interaction between each element.

An essential feature of the Switched Busbar Module design is its simplicity. Students easily and quickly construct and investigate circuits. Connections remain clearly visible so the schematic of the circuit is always apparent to the student.

Power Factor Load Bank and Static Compensator

The ideal equipment for introducing and providing a basic understanding of three-phase systems. Balanced and unbalanced load effects, neutral displacement, effect of power factor are all available on the unit, as is independent variation of each of the phases of the three-phase load. Phases can be pre-set to unity, or one of several lagging or leading power factors. The unit upholds the selected power factor, irrespective of load.

Using this product with the Transmission Line Simulator enables convenient production of regulation characteristics. For example, students can use a Kapp diagram as a manually controlled static VAR compensator for line regulation experiments. The ability to vary load while maintaining constant power factor also makes this an ideal load for TQ's Educational Transformer or Salient Pole Generator teaching units.

Power Factor Load Bank and Static Compensator **NE9060**

The Switched Busbar Module is a floor-standing enclosure. It is an industry-standard configuration of switches, isolators, incoming and outgoing feeders, busbars, current transformers, circuit breakers and instrumentation. A mimic diagram clearly details the location and functionality of all circuit components and test points.

Switched Busbar Module	NE9200
Portable Resistive Loadbank	NE7026
Portable Capacitive Loadbank	NE7027
Portable Inductive Loadbank	NE7028
Educational Transformer	NE9240
Salient Pole Generator	NE9250
Transmission Line Simulator	NE9280
Distribution Trainer	NE9202



Circuit Breaker Trainer

A compact, bench-mounting teaching product which demonstrates operational control of high and medium voltage three-phase switchgear with circuit protection. Ideal for demonstrations or laboratory experiments, the Circuit Breaker Trainer includes four different feeder circuits, each with their own protection devices. Earth fault simulation is included, as is simulation of remote and local control of circuit contactors.

Industry-standard switchgear, protection devices and components are used throughout.

Circuit Breaker Trainer	NE9111
Portable Resistive Loadbank	NE7026

Distribution Trainer

An educational d.c. and single-phase and three-phase a.c. line simulator, for a comprehensive range of practical investigations into the principles of electrical distribution. From fundamental concepts to the operation and protection of a typical industrial power distribution system, this versatile equipment is suitable for teaching a wide variety of technical levels.

The distribution trainer is straightforward to use, while effective in teaching with a student-friendly design. It reflects current engineering practice and teaching trends, and includes an up-to-date numerical protection relay which provides a wide range of functions.

Lecturers can use the equipment to promote awareness of fundamental electrical effects and laws, and for student experiments into radial and ring main distribution circuits. Balanced and unbalanced loads are configurable, and faults may be applied and their effects observed. The Distribution Trainer can easily be incorporated into a modular power system using a Switched Busbar Module (NE9200).



Distribution Trainer

NE9202

Protection Relay Test Set

A teaching console which gives students theoretical and practical experience with a variety of industrial relays. This includes experiments investigating overcurrent, earth fault, differential,

circulating current and distance numerical protection. It also covers relay setting and tripping characteristics, as well as grading and discrimination under fault conditions.

TQ's Protection Relay Test Set uses genuine industrial protection equipment and techniques, not simulation. A range of modern industrial relays, specially adapted by TQ for educational use, is available separately.

The equipment allows students to compare individual relay characteristics, as well as simultaneous comparison of any two relays to introduce the topic of discrimination.

The console incorporates instrumentation, power supplies, transformers and controls. It also has an ergonomic desk space for students to work on, and room to conveniently mount two relays (the test set will support up to two relays at once).

The equipment includes relay support software which enables users to program the relay modules on a computer. Alternatively, they can program the relays direct.



Protection Relay Test Set

PS250

Please turn to the next page for details of the industrial relays available for use with this product.

Overcurrent and Earth Fault Relay

An entry-level three-phase and earth fault overcurrent relay. Enables investigations into protection and monitoring of transformers, transmission lines and distribution schemes.



Overcurrent and Earth Fault Relay

PS251

Differential Protection Relay

A differential protection relay which enables investigations into protection of transformers, autotransformers, generators and other electrical apparatus with two windings. The relay clearly demonstrates the characteristics of three-phase differential protection. This includes high stability during "out-of-zone" faults, zero-sequence current filtering for each winding, high-speed operation, magnetising inrush restraint, amplitude and vector matching.

Differential Protection Relay

PS252

Directional/Non-Directional Overcurrent Relay

A directional/non-directional overcurrent relay for investigations into protection and monitoring of generator and transformer schemes, overhead lines, underground cables and backup on high-voltage systems.



Directional/Non-Directional Overcurrent Relay

PS253

Relays for use with TQ's Protection and Relay Test Set

The following products incorporate genuine modern industrial relays. For use with TQ's Protection and Relay Test Set (PS250), each relay is presented in an educational format and housed in a robust enclosure with carrying handle. The modules mount on the desk area of the Protection and Relay Test Set, and connect to the test set using multi-core cables and safety leads.

The lecturer or student sets up different fault circuits on the Protection and Relay Test Set. They then use the keypad and display on the relay module to program it to the settings needed for the tests. They can also use the software supplied with the Protection and Relay Test Set and computer (available separately) to program the relay module. The relay module is then connected to the fault circuits so tests can be performed.

Most tests are performed using single relays. However, there are enough connections on the Protection and Relay Test Set to test two relay modules at the same time.



Feeder Management Relay

A feeder management relay for investigations into the protection and monitoring of overhead lines and underground cables.

Feeder Management Relay

PS254

Distance Protection Relay

A distance protection relay allowing investigations into the protection and monitoring of overhead transmission lines.

Distance Protection Relay

PS255

Power System Simulator

The TQ Power System Simulator provides a safe and cost-effective environment in which engineers, technicians and control room operatives can gain knowledge-based learning and skills-based training in all aspects of electrical power systems.

It uses modern industrial instrumentation, control devices and techniques throughout, ensuring the steady-state and transient operating characteristics are typical of full-scale electrical power systems. It is possible to configure the Power System Simulator to represent any national electrical grid network.

The Power System Simulator provides all necessary facilities to support the practical content of a comprehensive course in electrical power systems. It includes a thorough manual with detailed experiment procedures, full theoretical support, and a structured series of practical investigations. The practical investigations describe studies into the operation, control and performance of power systems using per unit (pu) treatment. Other technical information fully covers safety and maintenance, and the protective relay manufacturer's operation and set-up manuals.

The Power System Simulator combines all the individual elements found in a typical electrical power system. These elements are:

- Generation
- Transformation
- Transmission
- Distribution
- Utilisation
- Protection

The open structure of the Power System Simulator allows students to individually investigate each of the system elements. This ensures students and trainees, working on their own or in groups, fully understand the principles involved with each part of a power system. They can then progress, in easy steps, to more advanced systems where two or more elements are interconnected. They can then study how these combined elements perform and interact.

The highest level of study is with all elements included. This allows students to investigate the performance of a complete power system. It also allows students to gain the skills and expertise required to operate, optimise and maintain the system. This progressive learning process allows students to more easily and quickly understand the principles involved with this complex topic.

The Power System Simulator consists of a self-contained, free-standing enclosure with rear access to all power components via interlocked doors. It includes full state-of-the-art built-in protection, instrumentation and loading facilities.

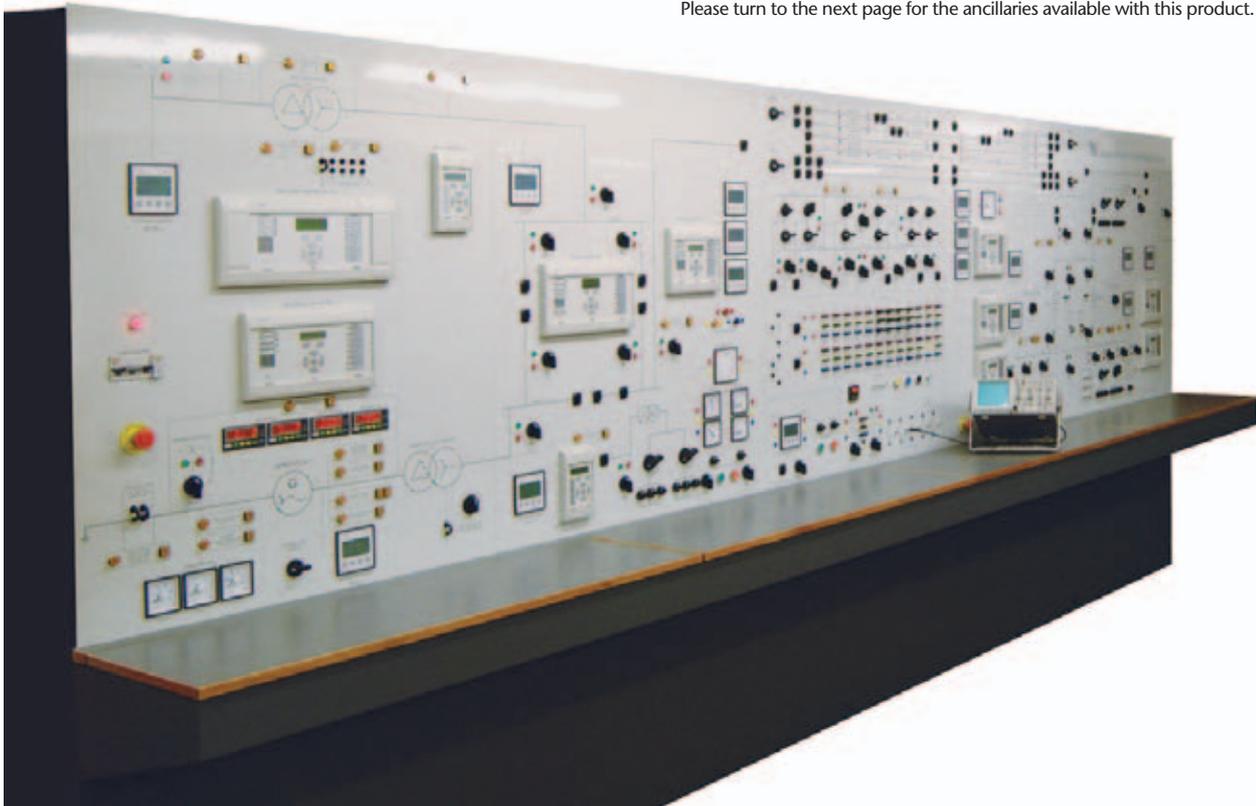
The front panel of the Power System Simulator provides access to all facilities including a full range of instrumentation, indicators, controls, meters and protective relays. A detailed mimic diagram assists students' understanding of the function of each facility and, therefore, how they should correctly connect and use them.

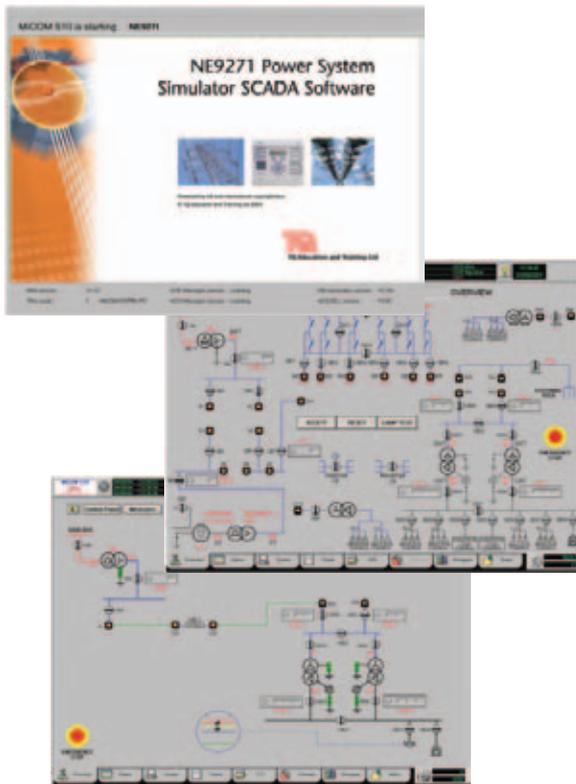
The Power System Simulator is one of TQ's most highly regarded products, used in institutions throughout the world.

Power System Simulator

NE9270

Please turn to the next page for the ancillaries available with this product.





Power System Simulator SCADA Package

TQ's Supervisory Control and Data Acquisition Software (SCADA) Package is a fully compatible, optional ancillary which extends the scope of experimentation possible with TQ's Power System Simulator (NE9270).

The SCADA Package consists of:

- a computer (PC)
- industrial SCADA software with graphics screens representing different aspects of monitoring and controlling the functions of the Power System Simulator
- interfaces to allow direct connection to a Power System Simulator
- a quality colour printer

The Power System Simulator includes intelligent electronic devices, including numerically-based protective relays and digital instrumentation. The SCADA software running on the PC connects to these devices to provide Power System Simulator operators with continuously updated system and power network information.

The facilities within the SCADA software package use industry-standard SCADA presentation formats and procedures throughout. These include supervision, plant protection, plant monitoring, switchgear control, event and alarm management. A wide range of functions is possible using the SCADA package to provide a comprehensive course in modern power systems.

Power System Simulator SCADA Package

NE9271

Second Generator

A self-contained motor and generator set which operates as a second generator for TQ's Power System Simulator (NE9270). The apparatus provides a wide range of additional and extended experimentation with the Power System Simulator over a wide range of topic areas.

The Second Generator can simulate both central generation and embedded generation, as well as providing experimentation into both "stiff" and "weak" systems. The generator contains a simple AVR which can operate in several modes.

The apparatus consists of two coupled machines mounted on a bed plate in the base of a control console. A vector drive controls the speed of the prime mover. An integral shaft encoder enables load angle analysis.

The console consists of a floor-standing control desk. It includes a clearly labelled mimic diagram on the front panel with instrumentation and comprehensive control systems devices. When the Second Generator is connected to a Power System Simulator operating with the optional SCADA package, the Second Generator automatically integrates into the SCADA system. This enables the SCADA software to monitor, control and analyse the Second Generator operation.



Second Generator

NE9272

Need more information?

To find out more about TQ, visit our website at www.tq.com. Here you can quickly and conveniently find detailed information about all of our products and buy many products **online**.

Alternatively, for additional information about any of our products or services, or to talk to one of our experts, contact TQ direct.



www.tq.com

Tel: +44 115 972 2611

Fax: +44 115 973 1520

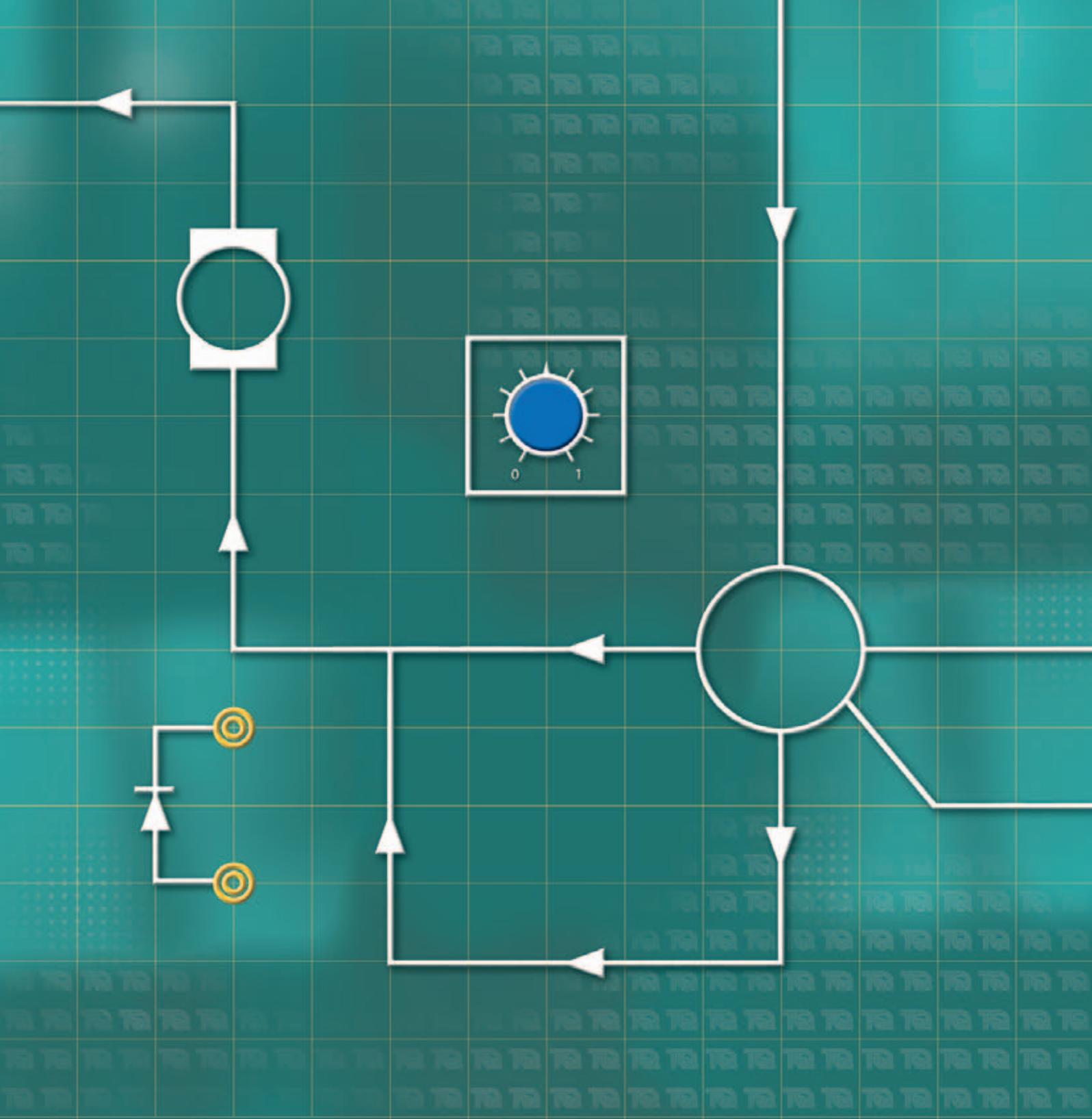
Email: info@tq.com

**TQ Education and Training Ltd
Bonsall Street, Long Eaton
Nottingham NG10 2AN**

© TQ Education and Training Ltd 2006

All rights reserved; no part of this publication may be reproduced, stored in any retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without the prior written permission of TQ Education and Training Ltd.

The information contained in this publication has been carefully prepared and is correct at the time of printing. However, in the interests of further improvement, the manufacturers reserve the right to modify the apparatus without notice.



TQ Education and Training Ltd

Bonsall Street
Long Eaton
Nottingham
NG10 2AN
England

T +44 115 972 2611
F +44 115 973 1520
E info@tq.com
W www.tq.com



TQ Education and Training Ltd

Integrated Learning Solutions