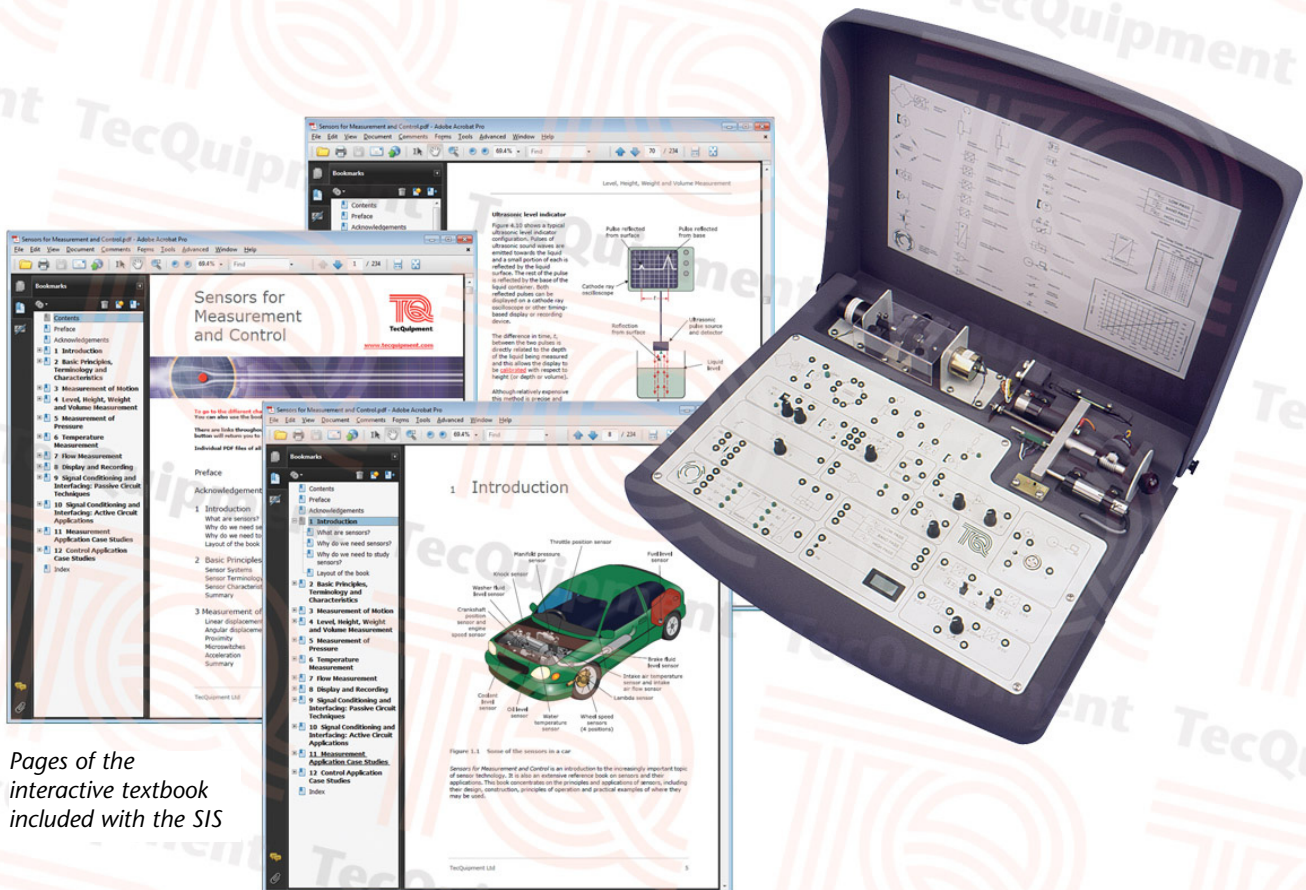


SIS

Sensor and Instrumentation System

Gives theoretical and practical experience of sensors and instrumentation, from basic uses to an introduction to control principles



Pages of the interactive textbook included with the SIS

- Complete course in sensors and instrumentation
- Self-contained portable desk-top module - just needs a mains electrical supply
- Selection of sensors, signal conditioning circuits and power supplies
- Includes interactive (pdf-based) specially-written textbook
- Multiple different sensors including optical, magnetic, proximity and strain gauges
- Completely safe low-voltage circuits
- Suited to a wide variety of academic levels

- TecEquipment Ltd, Bonsall Street, Long Eaton, Nottingham NG10 2AN, UK
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- An ISO 9001 certified company

SIS

Sensor and Instrumentation System

Description

The Sensor and Instrumentation System uses different, expertly designed teaching media to introduce students to sensors, instrumentation, measurement and control. It includes an ergonomic hardware module, complemented by an interactive textbook, software and user guides. The main parts are:

- A selection of sensors and signal conditioning components in a portable case (the hardware module)
- Interactive textbook and computer interface software (computer not supplied)
- Student and lecturer guides

Students study sensors and instrumentation using the textbook. They do practical experiments using the student guide and the hardware module. The lecturer guide gives typical results and technical information for course tutors.

To perform practical experiments, students set up and examine a wide selection of working sensor circuits using the hardware module. The hardware module has many different sensors and circuits with clear mimic diagrams of each circuit so that students understand what they connect.

The textbook covers the whole subject area of sensors, their principles and their applications. It is ideal for students of instrumentation and control from basic studies to first-year undergraduate. It is also for technicians and engineers. It describes sensor terminology, characteristics, the principles and applications of over 50 different sensors. It also covers display, recording, signal conditioning and includes questions, sample calculations and case studies.

The Sensor and Instrumentation System is ideal for distance and open learning.

Standard Features

- Supplied with an interactive (pdf-based) textbook and comprehensive lecturer and student guides
- Two-year warranty
- Manufactured in accordance with the latest European Union directives

Experiments

Studies of sensor behaviour, properties and characteristics, including:

- Strain gauges
- Linear and rotary potentiometers
- A linear variable differential transformer (LVDT)
- A variable-area capacitor
- A reed switch
- An opto-reflector
- An optical tachometer
- A d.c. tachogenerator
- A variable reluctance probe
- A four-bit optical encoder
- Data transmission
- An introduction to control principles

Recommended Ancillaries

- Suitable computer (not supplied by TecEquipment)
- Two-channel oscilloscope (OS2)

Essential Services

Bench space needed:

550 mm x 500 mm (plus space for a suitable computer if used)

Electrical supply (SM1000):

Single-phase 100 VAC to 230 VAC, 1 A, 50 Hz to 60 Hz

Operating Conditions

Operating environment:

Laboratory environment

Storage temperature range:

-25°C to +55°C (when packed for transport)

Operating temperature range:

+5°C to +40°C

Operating relative humidity range:

80% at temperatures < 31°C decreasing linearly to 50% at 40°C

Sound Levels

Less than 70 dB(A)

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SIS

Sensor and Instrumentation System

Specification

Nett dimensions and weight:

550 mm x 500 mm x 100 mm, 8 kg

Packed dimensions and weight:

0.055 m³ and 10 kg

Sensors:

- Linear potentiometer
- Rotary potentiometer
- Linear variable differential transformer
- Variable area capacitor
- Four metal foil strain gauges
- Reed switch (normally open)
- Opto-reflector (LED and phototransistor)
- D.C. motor (to drive the rotary assembly, speed range 0 to 2000 rev.min⁻¹)
- D.C. tachogenerator (with push button to load the d.c. motor)
- Four-bit encoder (gray code slotted disc with four pairs of LEDs and phototransistors either side)
- Optical tachogenerator (uses the least significant bit of the encoder to give a pulse proportional to shaft speed)
- Variable reluctance probe

Signal conditioning circuits:

- Differential amplifier
- A.C. capacitance bridge (with an 80 kHz oscillator)
- Comparator (with output relay to control power devices)
- Phase-sensitive detector (produces a d.c. output signal, includes a 3 kHz oscillator to energise the LVDT primary)
- Four-bit decoder (to decode output from the gray scale encoder to binary and analogue)
- Filters (low pass, band pass and high pass)
- Differential amplifier
- Voltage-to-frequency and frequency-to-voltage converter (includes a fibre optic cable for comparison with a wire)
- Voltage-to-current and current-to-voltage converter
- Bridge completion resistors

Other hardware:

- Voltage and frequency meter (LCD)
- Lead set
- Mains lead with d.c. converter
- Mini-pod computer interface

Interactive pdf-based Textbook:

"Sensors for Measurement and Control", by Peter Elgar.

Includes:

- Basic principles, terminology and characteristics
- Measurement of motion, level, height, weight and volume
- Measurement of pressure, temperature and flow
- Display and recording
- Signal conditioning and interfacing: passive circuit techniques
- Signal conditioning and interfacing: active circuit applications
- Measurement application case studies
- Control application case studies

Minimum computer specifications needed:

- Pentium 133
- 32 MB RAM
- CD-ROM drive
- Mouse
- SVGA monitor (800 x 600 resolution, 16-bit colours)
- Microsoft® Windows® operating systems 2000/XP/NT4 (service pack 6)

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