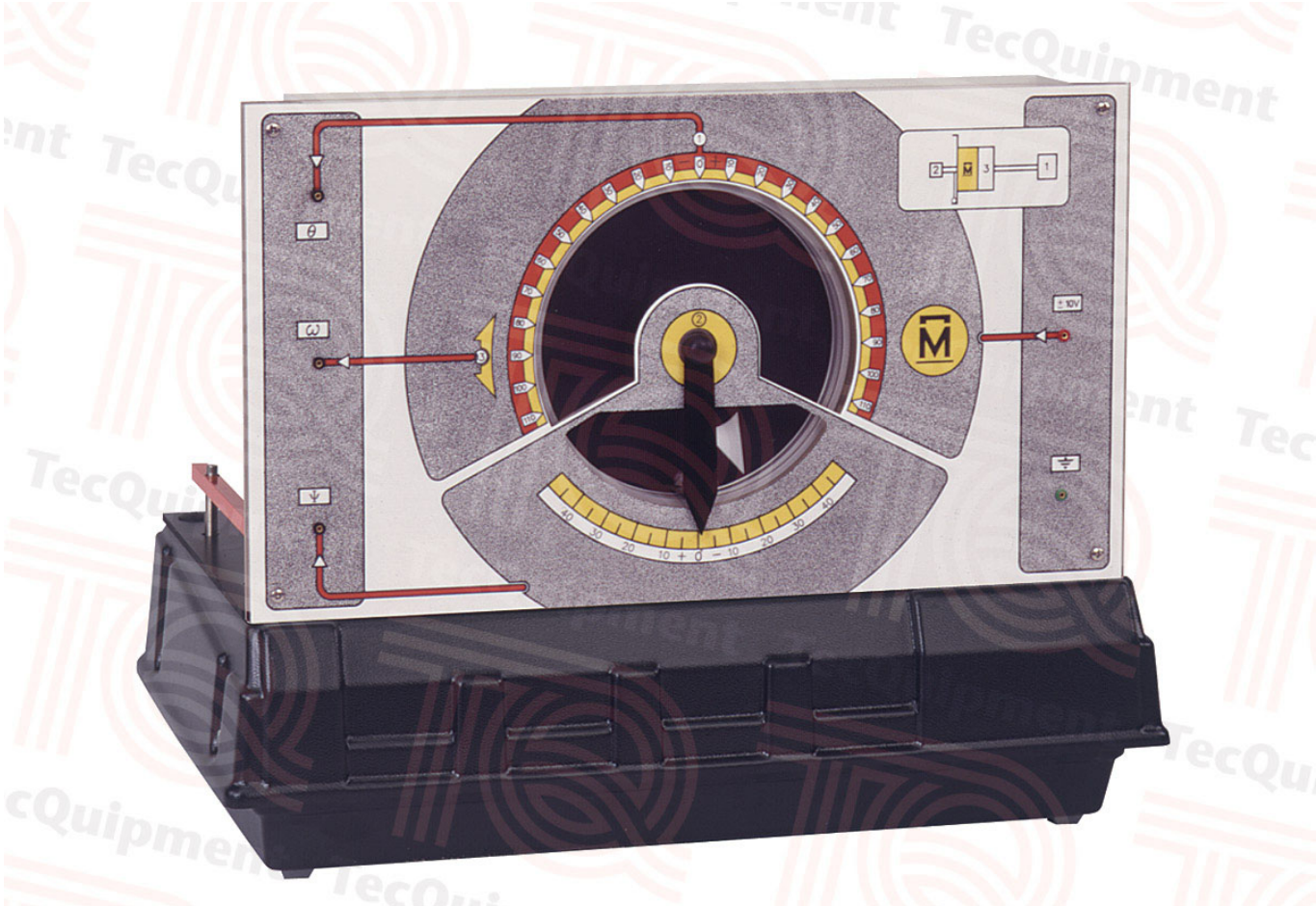
CE109

Ball and Hoop Apparatus

Compact, self-contained, bench-mounting apparatus to study basic and advanced principles of control of a ball in a hoop



- Self-contained and compact bench-mounting unit
- Ideal for classroom demonstrations and student project work
- Shows the problems of speed and position control of a mobile body or liquid in a container
- Mimics industrial, aeronautical, fluid transport and pumping system problems with realistic results
- All inputs and outputs buffered for connection to TecQuipment's optional controllers or other suitable controllers
- Front panel includes a mimic diagram of the process so that students can clearly see what they are controlling
- Shows basic control of position or speed, and advanced studies of liquid slop

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Description

The CE109 Ball and Hoop Apparatus shows the use of electromechanical servo systems for position and velocity control. It also works as a model to show liquid slop problems, for example: aircraft missile fuel storage, fuel tankers and industrial pumping systems.

The apparatus has a steel ball that rolls inside a hoop. The hoop is free to rotate, but controlled by a servomotor. Transducers give outputs of the hoop and ball positions.

When the hoop is under angular position control, the ball moves like a cylindrical pendulum. This allows students to use it as a model for the study of liquid slop dynamics.

Advanced studies cover:

- The influence of liquid slop behaviour on vehicle control system design
- The use of 'pole zero' in the analysis of control systems

Note: You must use the CE109 with TecQuipment's optional CE120 Controller, the optional CE122 Digital Interface, or other suitable controllers with 10 V inputs and outputs. Details of the CE120 and CE122 are on separate datasheets.

The CE109 includes a set of cables and connectors for connection to other equipment.

All control connections work with 0 to 10 VDC signals.

Standard Features

- Supplied with comprehensive user guide
- Two-year warranty
- Made in accordance with the latest European Union directives

Experiments

- The design and analysis of servo control systems for position and velocity control
- The analysis and modelling of liquid slop dynamics
- The use of 'pole zero' in the analysis of control systems

The flexible design of the equipment allows the user to develop many other analysis and control exercises to suit their needs. It is good for extended or advanced control experiments, and is ideal for student project work.

Essential Ancillaries

- Controller (CE120) – A controller with analogue and digital controls and instruments

  or

- Digital Interface (CE122) – An interface which connects between most products in the Control Engineering range and a suitable computer (not included)

  or

- Other suitable controller with 10 V inputs and outputs

  Both the CE120 and the CE122 include TecQuipment's CE2000 Control Software (see separate datasheet) with editable, pre-made control experiments for use with the CE109.

Essential Services

Electrical supply:
240/110 VAC, 1 A, 50/60 Hz, with earth
Other voltages and frequencies available to special order

Bench space needed:
1 m x 750 mm

Operating Conditions

Operating environment:
Laboratory environment

Storage temperature range:
–25°C to +55°C (packed)

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)

Specifications

Nett dimensions and weight:
540 mm x 330 mm x 420 mm, 18.7 kg

Packed dimensions and weight:
0.3 m^3, 41 kg (approx – packed for export)

Inputs: 0 to 10 VDC
- Motor drive signal: 0 to +/– 10 VDC

Outputs: 0 to 10 VDC
- Hoop angle: 0 to +/– 10 VDC
- Hoop velocity
- Ball position

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