

# Theory of Machines

# TM1027

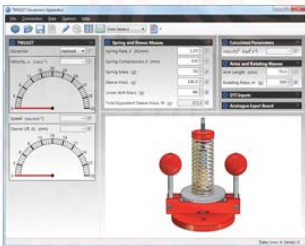
## Governors

**Shows how different governors work, including Hartnell, Porter and Proell governors**

Works with  
**VDAS®**



Includes three different governors  
(one shown already fitted)



Screenshot of the optional  
VDAS® software



- Portable, self-contained bench-top unit, suitable for classroom demonstrations and use by small groups of students
- Demonstrates the effects of speed, mass, geometry and other variables of governor characteristics
- Includes three easy-to-fit governors: Hartnell, Porter and Proell
- Unique multifunction control for coarse and fine adjustment of velocity and direction
- Interlocked, transparent dome allows students to see the governors spinning in safety
- Includes additional weights to change the mass of the Porter and Proell governor sleeves
- Supplied with different springs and rotating masses for the Hartnell governor
- Works with TecEquipment's Versatile Data Acquisition System (VDAS®)

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- An ISO 9001 certified company
- VDAS is a registered trademark of TecEquipment Ltd



# TM1027

## Governors

### Description

A base unit contains a variable-speed motor. The motor turns each of three different governors: Proell, Porter and Hartnell. Note: you test one governor at a time.

Each governor uses rotating weights (masses) and levers to raise a 'sleeve'. The Porter and Proell governors raise the sleeve against the action of gravity. The Hartnell governor raises the sleeve against a compression spring. A sensor measures the position (lift) of each governor sleeve as it rises.

Additional weights (supplied) allow the user to vary the mass of the sleeve of the Porter and Proell governors. Additional springs (supplied) allow the user to vary the spring rate of the Hartnell governor. Users may also adjust the arm length and rotating mass of the Hartnell governor.

The clear dome includes an interlock that shuts off power to the motor. This allows students to see the governors and use them in safety while still giving them access to examine or adjust them.

The base unit includes a motor control and a multiline display. The control includes unique direction, coarse and fine velocity adjustment and 'press to stop' functions. The display shows governor velocity (speed) in units of revolutions per minute and radians per second. It also shows sleeve lift.

The equipment works with TecQuipment's Versatile Data Acquisition System (VDAS® available separately). Using VDAS® enables accurate real-time data capture, monitoring and display, calculation and charting of all relevant parameters on a computer (not supplied) making tests quick and reliable.

### Standard Features

- Supplied with comprehensive user guide
- Five-year warranty
- Manufactured in accordance with the latest European Union directives

### Recommended Ancillaries

- Versatile Data Acquisition System – bench-mounted version (VDAS-B)

### Experiments

- Finding characteristic curves of governor speed against sleeve lift.
- Comparison of governor types in terms of sensitivity, stability and effort.
- On the Porter and Proell governors, the effects of varying centre sleeve mass.
- On the Hartnell governor, the effect of varying:
  - arm length
  - spring rate
  - spring compression
  - rotating mass
- Demonstration of the isochronous condition (Hartnell governor).

### Essential Services

*Bench space needed:*

600 mm x 600 mm (plus space for the optional VDAS-B and a computer if needed).

*Electrical supply:*

Single-phase 90 VAC to 264 VAC  
50 Hz to 60 Hz

### Operating Conditions

*Operating environment:*

Laboratory

*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)

### Specifications

*Nett Dimensions and Weights:*

Base Unit with safety dome: 600 mm wide x 600 mm front to back x 370 mm high and 18 kg

Governors and additional parts: 4 kg

*Approximate Packed Volume and Weight:*

0.23 m<sup>3</sup> and 25 kg

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*tradition.*

*innovation.*

*integration.*

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