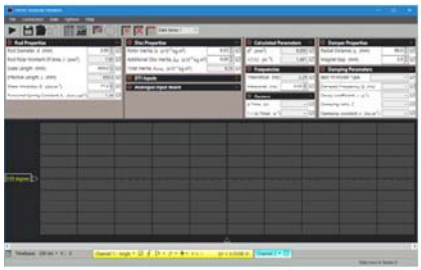
VDAS® TM165

FREE TORSIONAL VIBRATIONS

Experiment that demonstrates the oscillatory motion of a disc attached to a slender rod. Fits on to the Free Vibrations test frame.



SCREENSHOT OF THE VDAS® SOFTWARE

SHOWN FITTED WITH THE OPTIONAL DAMPER KIT (TM165A)

KEY FEATURES

- One of a series of modular experiments that explore free vibrations in simple systems
- Uses the rotational movement of a disc suspended from a circular rod for a highly visual and intuitive display of simple harmonic motion
- Quick, safe, and easy for students to use - needing minimal laboratory supervision
- Optional Damper Kit (TM165a) for extra experiments in oscillation damping
- Includes a selection of specimen rods and an additional inertia ring for a range of experiments
- Non-contacting displacement sensor to see and measure oscillatory motion with negligible damping effect
- Works with TecQuipment's VDAS® for real-time display of the displacement waveform and its derivatives

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VDAS® TM165

FREE TORSIONAL VIBRATIONS

DESCRIPTION

This product is part of a range that explores free vibrations in simple 'one degree of freedom' systems.

It introduces students to key scientific terms such as:

- Simple harmonic motion (SHM)
- Frequency of oscillation
- Shear modulus
- Polar moment of area
- Mass moment of inertia
- Phase difference between displacement and its derivatives

This product fits to the sturdy test frame (TM160) for study or demonstration.

This product includes a rotating disc or 'rotor' at the end of a slender rod. You can compare this with the mass-spring system, except it replaces mass with the rotor's mass moment of inertia and the spring with the twisting of the rod.

A back panel fixes to the test frame. The panel holds two vertical runners. The runners hold a chuck that securely grips a specimen rod at any position along its length. The bottom of the rod fixes to a rotor that is free to rotate. A bushing ensures the rotation remains along the axis of the rod, and supports the rotor during setup.

A non-contacting sensor next to the rotor disc measures the amplitude of the rotational oscillations. The sensor has no physical contact with the rotor, for negligble damping.

The equipment includes a selection of rods of different diameter and the chuck position may be adjusted. A scale on the back panel referenced to the bottom of the rod gives a direct indication of the rod's 'effective' length. Students can use these to discover how rod diameter and length affect the torsional oscillations.

Students may also fit an additional inertia disc to the rotor to see how the increased inertia affects the torsional oscillations.

Students lower the rotor support when ready and then gently twist and release the rotor to cause free torsional oscillations in the specimen rod. They then find the frequency of oscillation and compare it with that predicted from theory.

TecQuipment calibrate the displacement sensor to work with VDAS® (mkII) for real-time display and data acquisition of system oscillation waveforms. Students use the software to see the displacement waveform and measure frequency. The software calculates and shows the first two derivatives of displacement - velocity and acceleration.

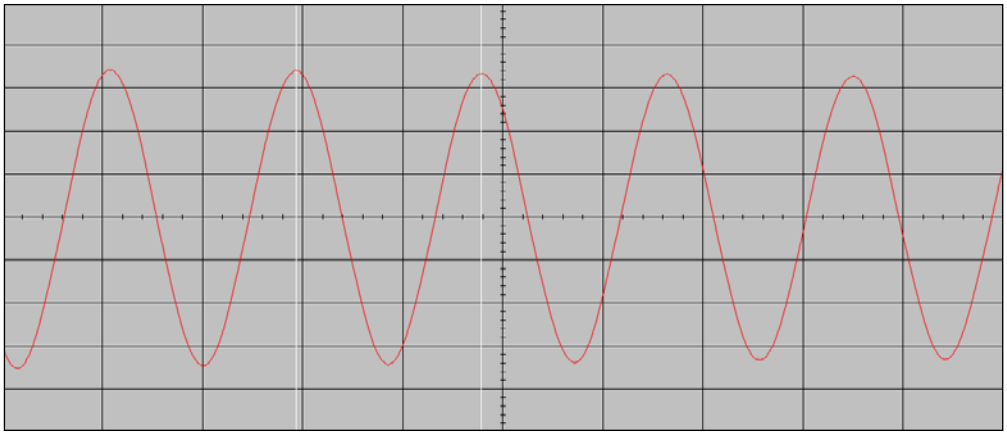
TecQuipment have specifically designed the TM165 to work with VDAS (mkII). However, the sensor output may be connected to your own data acquisition system or oscilloscope if desired.

Students may fit an optional Damper Kit (TM165a) to test how viscous damping affects the rotor oscillations. This kit includes a bracket that holds a powerful magnet above the rotor of the TM165. The magnet induces eddy currents in the oscillating rotor, opposing and damping its motion. The damping effect is proportional to velocity and becomes zero when the rotor stops oscillating. This makes it a form of viscous damping.

When using the Damper Kit, VDAS® can fit its displayed data to underdamped viscous damping models.

STANDARD FEATURES

- Supplied with lecturer guide and student guide
- Five-year warranty
- Manufactured in accordance with the latest European Union directives
- ISO9001 certified manufacturer



VDAS® SOFTWARE SHOWING PLOT OF OSCILLATION

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VDAS® TM165

FREE TORSIONAL VIBRATIONS

LEARNING OUTCOMES

- Rod diameter and frequency of oscillation
- Rod length and frequency of oscillation
- Inertia and frequency of oscillation
- Phase difference between displacement and its derivatives
- Damped torsional oscillations (needs optional Damper Kit)

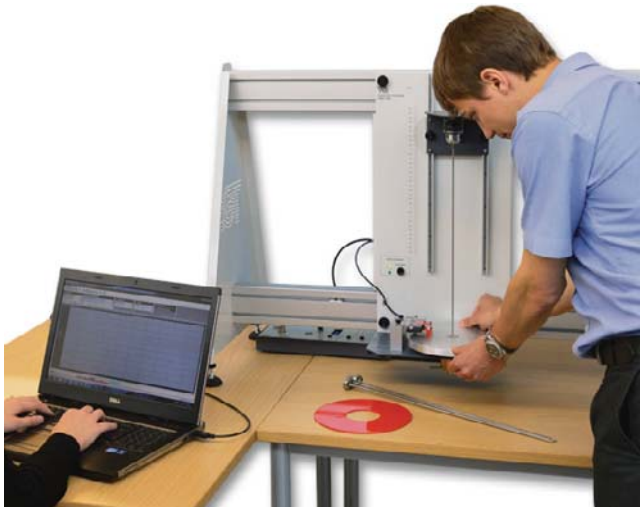
ESSENTIAL BASE UNIT

- Free Vibrations Test Frame (TM160)

ESSENTIAL ANCILLARY

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

NOTE: This equipment needs the new VDAS® (mkII) and will not work with earlier versions of VDAS®. If unsure, contact TecQuipment or your local agent.



THE TM165 IN USE (OTHER ITEMS NOT INCLUDED)

RECOMMENDED ANCILLARY

- Damper Kit (TM165a)

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

SPECIFICATIONS

TecQuipment is committed to a programme of continuous improvement; hence we reserve the right to alter the design and product specification without prior notice.

TM165

NETT DIMENSIONS AND WEIGHT:

650 mm high x 310 mm wide x 270 mm front to back and 11 kg

APPROXIMATE PACKED VOLUME AND WEIGHT:

0.15 m^3 and 15 kg

TOOLS AND OTHER PARTS INCLUDED:

- 4 x specimen rods of different diameter.
- Additional inertia disc
- Hexagon tool

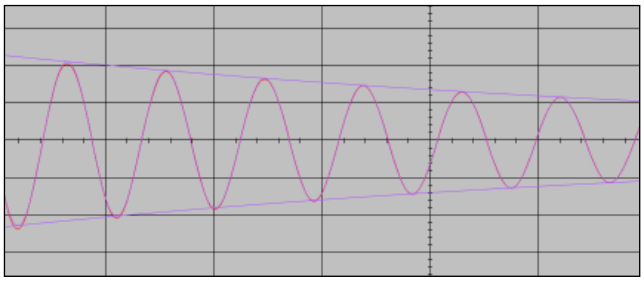
TM165A

NETT DIMENSIONS (ASSEMBLED) AND WEIGHT:

70 mm high x 170 mm wide x 200 mm front to back and 0.7 kg

APPROXIMATE PACKED VOLUME AND WEIGHT:

0.015 m^3 and 1.5 kg



VDAS® SOFTWARE SHOWING PLOT OF DAMPED OSCILLATION

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