

TM 155

Free and Forced Vibration Apparatus



Technical Description

All set-ups of this experimental unit on the theory of vibrations are rapidly and securely assembled on a double profile frame made of aluminium using slot nuts and clamping levers. The oscillator consists of a beam mounted in ball bearings at one end; a helical spring is hung on the other end of the beam. The attachment of springs, the exciter and a damper to a perforated panel permits a wide range of different set-ups to be reproduced. Either an unbalance exciter or a displacement exciter generate vibrations; the frequency of the vibrations can be adjusted using the electronic control unit. The displacement exciter can be fitted directly to the base of the spring. The vibrations can be damped using the adjustable viscosity damper. To record vibration processes over time, a mechanical drum plotter is included. The experiment also includes an amplitude contact with a TTL output, e.g. for triggering stroboscopes.

A practice set for torsional vibrations (TM 150.02) is available as accessories. The sensor TM 150.01 enables to measure electrically the amplitudes of various oscillators. Alternatively, measured values can be evaluated with the software for data acquisition TM 155.20.

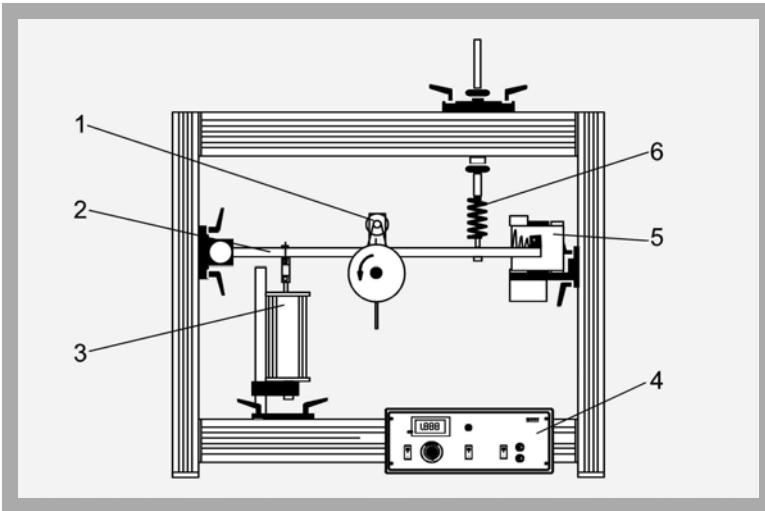
Learning Objectives / Experiments

- natural vibration
- damped vibration
- inertia force and displacement excitation
- forced vibration
- resonance
- amplitude and phase response

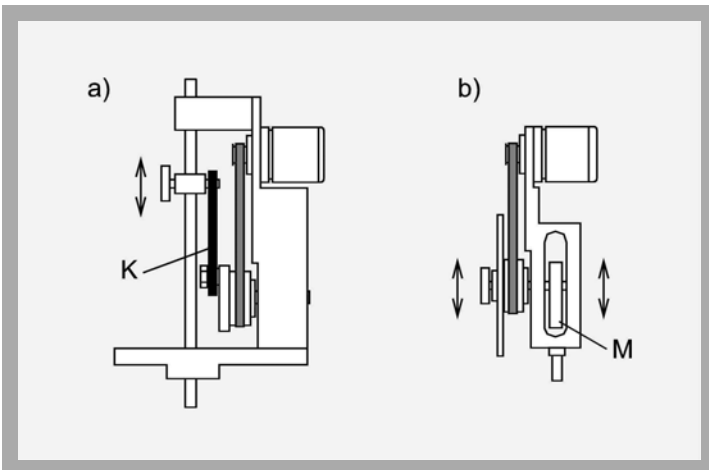
- * **Demonstration of fundamental aspects of mechanical vibration**
- * **Damping and resonance with forced vibrations**
- * **Two different principles of exciting vibration**

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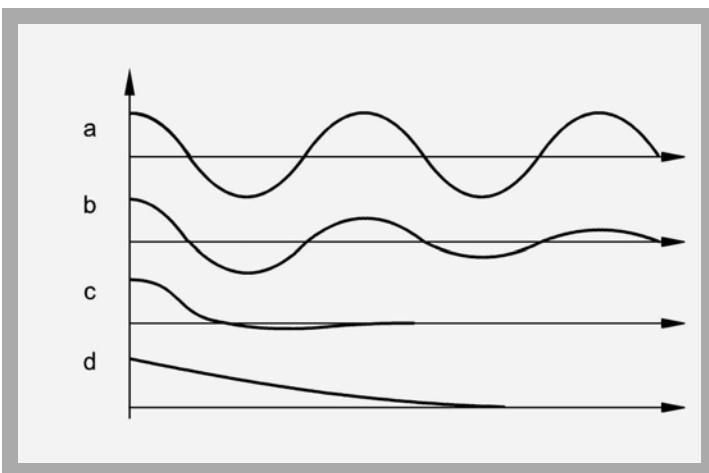
Free and Forced Vibration Apparatus



1 unbalance exciter, 2 stiff beam as discrete vibrator, 3 damper, 4 exciter control unit, 5 drum recorder for recording vibration, 6 suspension and oscillating spring



a) displacement exciter with rigid coupling rod K, b) unbalance exciter with gyrating mass (M) that can be fitted off-centre



Forms of vibration for varying damping: a) no damping, $D = 0$, continuous vibration, b) low damping, $0 < D < 1$, c) $D = 1$, aperiodic limit case, d) heavy damping, $D > 1$, creep case

Specification

- [1] basics of mechanical vibration, natural damped and forced vibrations
- [2] bar-type oscillator
- [3] three helical springs
- [4] unbalance exciter with DC motor, 0,77kg
- [5] displacement exciter with DC motor
- [6] electronic control unit with digital display, exciter frequency adjustable
- [7] oil-filled damper
- [8] electrically driven drum recorder
- [9] amplitude meter with electric contact for triggering equipment
- [10] storage system to house the components

Technical Data

- Bar-type oscillator: LxWxH: 700x25x12mm, 1,6kg
- Helical springs
 - 0,75N/mm
 - 1,5N/mm
 - 3,0N/mm
- Exciter frequency: 0...50Hz, electronically controlled
- Unbalance of the unbalance exciter: 0...1000mmg
- Stroke of the displacement exciter: 20mm
- Damper constant: 5...15Ns/m, oil-filled
- Mechanical chart recorder
 - feed: 20mm/s
 - paper width: 100mm

Dimensions and Weight

- LxWxH: 1.000x420x900mm
- Frame opening WxH: 870x650mm
- Weight: approx. 52kg

Required for Operation

230V, 50/60Hz, 1 phase or 120V, 60Hz/CSA, 1 phase (exciter control unit)

Scope of Delivery

- 1 frame
- 1 bar-type oscillator
- 3 helical springs
- 1 unbalance exciter
- 1 displacement exciter
- 1 exciter control unit
- 1 damper
- 1 amplitude meter
- 1 drum recorder
- 1 storage system
- 1 manual

Order Details

040.15500 TM 155 Free and Forced Vibration Apparatus

TM 155

Free and Forced Vibration Apparatus

Available Accessories:

Product no. Order text

040.15002 TM 150.02 Free and Damped Torsional Vibrations

040.15520 TM 155.20 Software for Data Acquisition

040.15001 TM 150.01 Vibration Sensor with Clamping Set
with

040.15100 TM 151 Sensor Supply Module