



**P 1.5.2**

**Harmonic oscillations**

P 1.5.2.1 Oscillation of a spring pendulum – recording path, velocity and acceleration with CASSY

P 1.5.2.2 Dependency of the oscillation period of a spring pendulum on the oscillating mass

Oscillation of a spring pendulum – recording path, velocity and acceleration with CASSY (P 1.5.2.1)

| Cat. No. | Description                         | P 1.5.2.1-2 |
|----------|-------------------------------------|-------------|
| 352 10   | Helical spring, 2 N, 0.03 N/cm      | 1           |
| 342 61   | Set of 12 weights, 50 g each        | 1           |
| 336 21   | Holding magnet with clamp           | 1           |
| 337 631  | Motion sensing element              | 1           |
| 524 032  | Motion transducer box               | 1           |
| 501 16   | Multicore cable, 6-pole, 1.5 m long | 1           |
| 524 010  | Sensor CASSY                        | 1           |
| 524 200  | CASSY Lab                           | 1           |
| 300 01   | Stand base, V-shape, 28 cm          | 1           |
| 300 41   | Stand rod, 25 cm                    | 1           |
| 300 46   | Stand rod, 150 cm                   | 1           |
| 301 01   | Leybold multiclamp                  | 2           |
| 301 08   | Clamp with hook                     | 1           |
| 309 48   | Cord, 10 m                          | 1           |
| 501 46   | Pair of cables, 1 m, red and blue   | 1           |
|          | <i>additionally required:</i>       |             |
|          | 1 PC with Windows 95/NT or higher   | 1           |

When a system is deflected from a stable equilibrium position, oscillations can occur. An oscillation is considered harmonic when the restoring force  $F$  is proportional to the deflection  $x$  from the equilibrium position.

$$F = D \cdot x$$

$D$ : directional constant

The oscillations of a spring pendulum are often used as a classic example of this.

In the first experiment, the harmonic oscillations of a spring pendulum are recorded as a function of time using the motion transducer and the computer-assisted measured value recording system CASSY. In the evaluation, the oscillation quantities path  $x$ , velocity  $v$  and acceleration  $a$  are compared on the screen. These can be displayed either as functions of the time  $t$  or as a phase diagram.

The second experiment records and evaluates the oscillations of a spring pendulum for various suspended masses  $m$ . The relationship

$$T = 2\pi \cdot \sqrt{\frac{D}{m}}$$

for the oscillation period is verified.