



Fig. 2: Gravitation torsion balance with additional equipment set up ready for use

Note:

The following formula applies for the force of attraction between two masses m_1 and m_2 :

$$F = G \cdot \frac{m_1 \cdot m_2}{r^2}$$

(r = distance between the masses).

From this, we can calculate

$$G = \frac{\pi^2 b^2 d S}{m_1 T^2 L}$$

This formula for the gravitation constant only contains measurable variables. The mass of the small balls is not included in the calculation, so it is not necessary to know this.

Apparatus:

1 gravitation torsion balance	332 10
1 steel tape measure	311 77
1 lamp housing	450 60
1 lamp 6 V / 30 W	450 51
1 aspherical condenser	460 20
1 transformer 6 V, 30 W, e.g.	
transformer 6 V / 30 W	562 73
1 stop-clock	313 05
1 pair of magnets	510 48
2 saddle bases	300 11
1 Leybold multiclamp	301 01
1 stand rod, bent at right angles	300 51
1 stand rod, bent by 15°	300 52
1 large stand base	300 01
1 pair of levelling screws	300 06

Setting up:

Stick the self-adhesive scale included in the scope of delivery of the torsion balance on a steady base or on a wall (refer to the instructions for use 332 10 for the distance of the scale from the torsional balance and for the height h at which it must be set up).

Set up the torsion balance in accordance with the instructions for use 332 10, at first without the

large lead balls.

An alternative way of setting up the balance is to fit it to a stand base, and then place the latter on a flat, rough (concrete or stone) surface. Two saddle bases can be used here as counterweights for the illuminating equipment. The setup must remain completely still during measurement.

Setting up the light pointer:

Equip the condenser with the diaphragm holder and insert the 1 mm slit. Place the lamp in the correct position for the experiment (refer to Fig. 2 or Fig. 3), and focus the lamp filament on the torsion balance mirror by moving the lamp insert. The light filament must be set up vertically. Finally, focus the slit on the scale by moving the whole stand setup along the angled stand rod. Always make readings on the scale from the same shadow edge of the slit. To do this, focus the shadow edge so that it is possible to make readings to within 0.5 mm (also refer to the instructions for use 332 10 for how to set up the light pointer).

Fig. 3: Gravitation torsion balance: setup alternative

