

Description of the Apparatus

In Fig.1 you can see the general view of the apparatus set up on your desk, which will be used in the experiment. The instrument is a spectroscope to be equipped with a detector to act as a simple spectrometer.

To start adjusting the apparatus, you should first pull up the white cover of the box (Fig.1). The cover pivots on one side of the base of the apparatus. In order to establish a dark environment for the detector, the cover should be returned to its initial position and kept tightly closed during the measurement of the spectra. The power cord has a switch that turns the halogen lamp on and off. There are four screws to level the apparatus (a magnified view of which you can see in right inset of Fig.1)

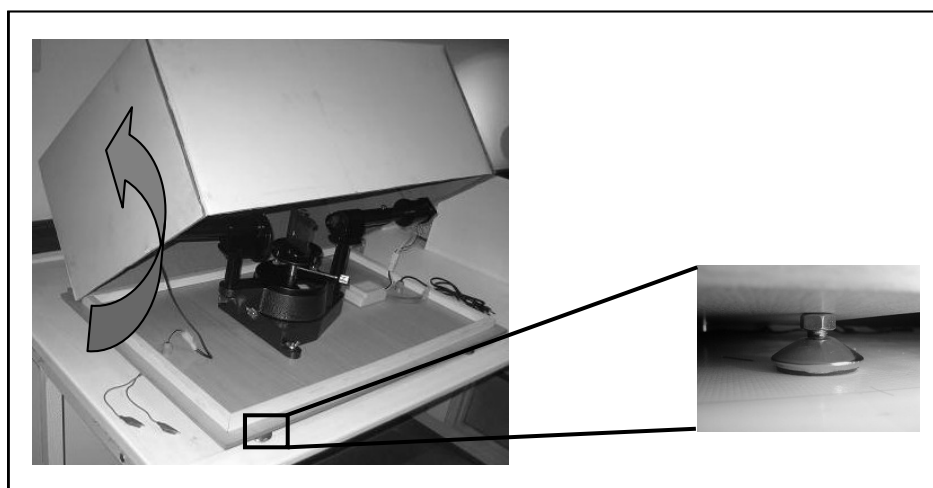


Figure 1. Apparatus of the experiment. One of the level adjusting screws is enlarged in the right inset.



Warning 1: Avoid touching the halogen lamp and its holder which will be **hot** after the lamp is turned on!



Warning 2: Do not manipulate the adaptor and its connections. Power is supplied to the apparatus through 220 V outlets!

The top view of the apparatus is shown in Fig.2 . The details are introduced in the figure.

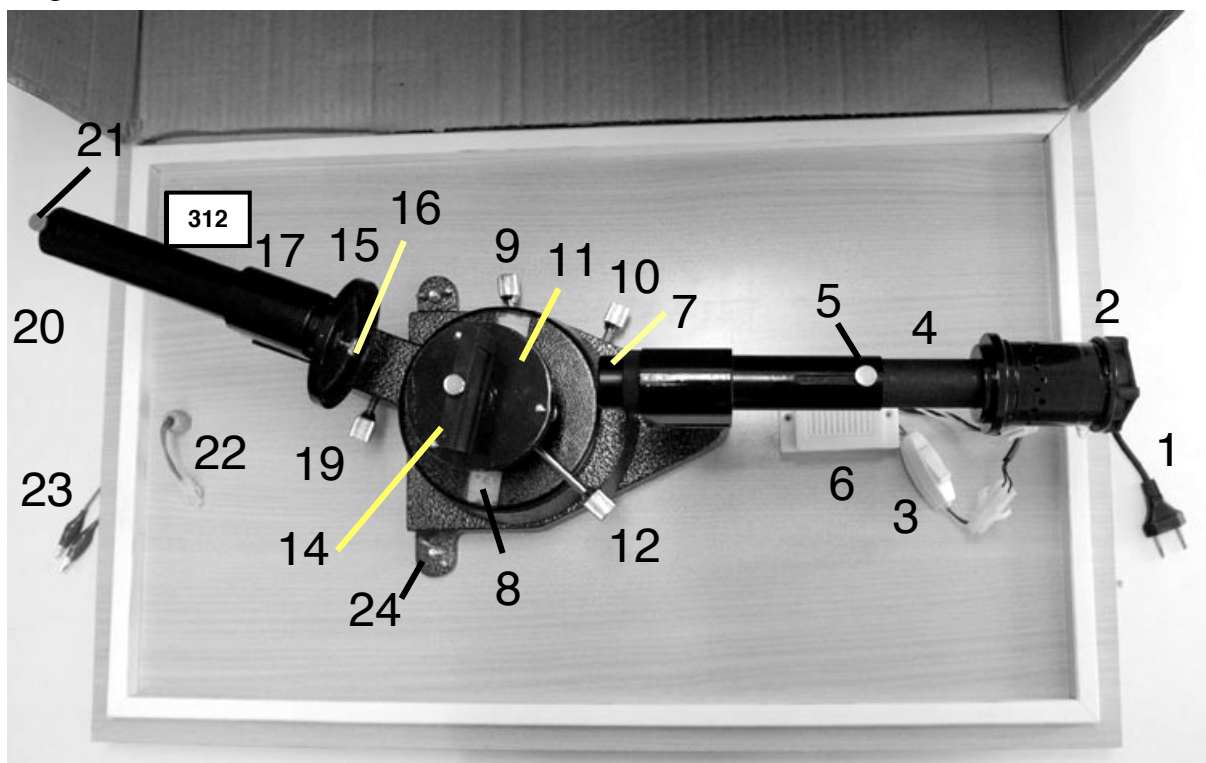


Figure 2.

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|---|---|
| 1. Power cord | 14. Grating holder |
| 2. Halogen lamp and its cooling fan | 15. Sample holder |
| 3. On/Off switch | 16. Fixing and adjusting screw for the sample and glass holder (Fig. 6) |
| 4. Arm of adjustable length | 17. Rotatable arm |
| 5. Adjusting screw | 18. Rotatable arm's lock (Fig.4) |
| 6. Adaptor: 220V – less than 12 V | 19. Fine adjustment for the rotatable arm |
| 7. Lens | 20. Detector position |
| 8. Vernier | 21. Fixing screw for the detector |
| 9. Vernier's lock | 22. Connecting socket for the detector |
| 10. Fine adjustment screw for the vernier | 23. Connection to the multimeter |
| 11. Grating's stage | 24. Fixing screw to the base |
| 12. Grating's stage's fixing screw | |
| 13. Adjustment screw for leveling the grating's stage (shown in Fig. 4) | |

The number mentioned on the top-left corner, is the **apparatus number**.

The angle, which the rotatable arm makes with the direction of the fixed arm of the apparatus, could be measured by a protractor equipped by a vernier. In this vernier resolution scale is $30'$ (minutes of arc). This instrument is able to measure an angle with accuracy of $5'$.

In addition to the apparatus you should find a box (Figure 3), containing the following elements:

1: a detector in its holder; 2: a 600 line/mm grating; 3: the sample and a glass substrate mounted in a frame.

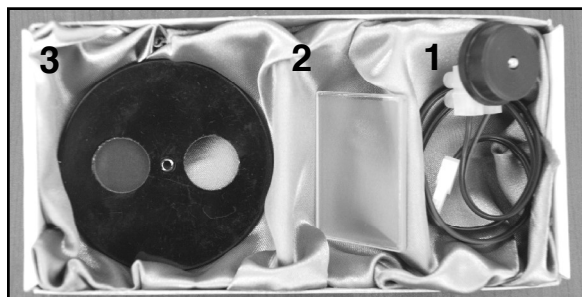


Figure 3. The small box, containing the glass and sample holder, a diffraction grating and a photoresistor.

First, you should take the grating out of its cover and put it into its frame (the grating holder, Fig. 4), carefully.

CAUTION: Touching the surface of the grating could reduce its diffraction efficiency seriously, or even damage it!

There are three adjustment screws (Fig. 4) for making the grating stand vertically in its position.

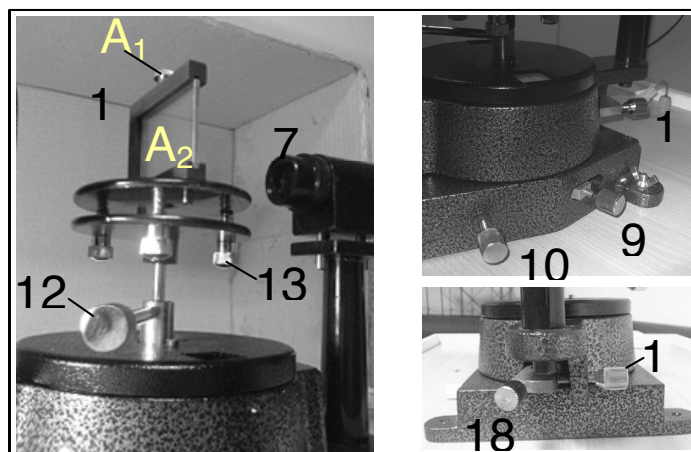


Figure 4. Locking, fixing and adjusting screws of the apparatus. A_1 : Fixing screw for the grating; A_2 : The grating. 7, 9, 10, 12-14, 18 and 19 are explained in Figure 2.

The detector should be tight to its position, in the end of the rotatable arm, (Figure 5):

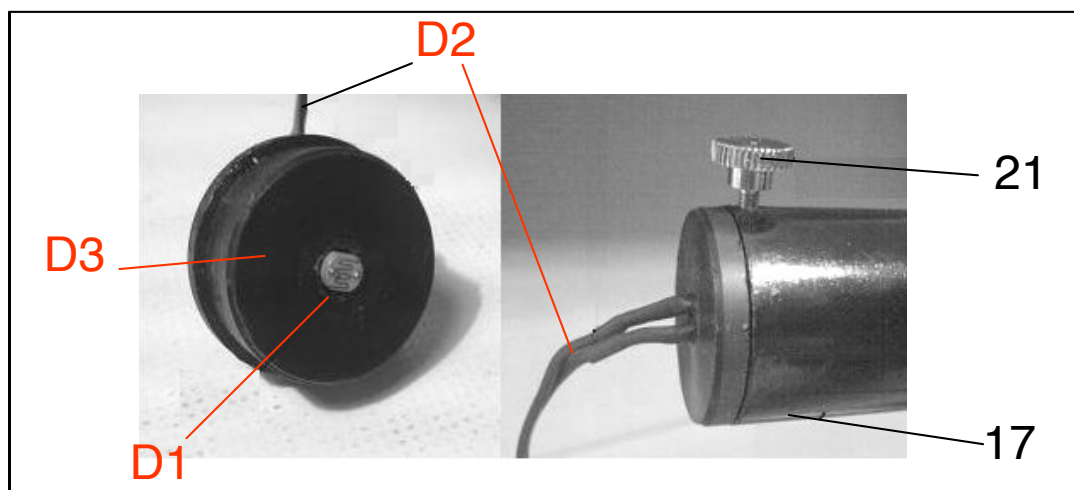


Figure 5 . The detector and its holder. D1: The photoresistor; D2: connecting wire. D3: The detector holder. 17 and 21 are explained in Fig. 2.

The sample and the glass substrate are fixed to a frame (holder) (Fig. 6c), which would be attached to the instrument by a fixing screw (Fig. 6a, item 16). This frame is rotatable and one can put the sample or the glass substrate in front of the entrance hole, by turning the frame around the fixing screw (Fig. 6a).

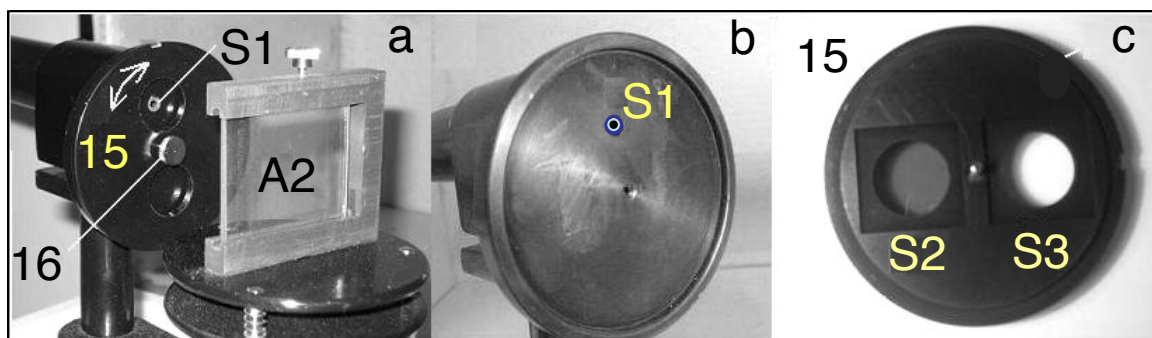


Figure 6 . The Sample and the glass holder. S1: Entrance hole; S2: Sample; S3: Glass substrate. 15 and 16 are explained in Fig. 2.

The Multimeter which you should use for recording the signal detected by the photoresistor is shown in the Fig. 7. This multimeter can measure up to 200 M Ω . The red and black probe wires should be connected to the instrument as is shown in the Fig. 7. The on/off button is placed on the left hand side of the multimeter (Fig. 7, item M1).

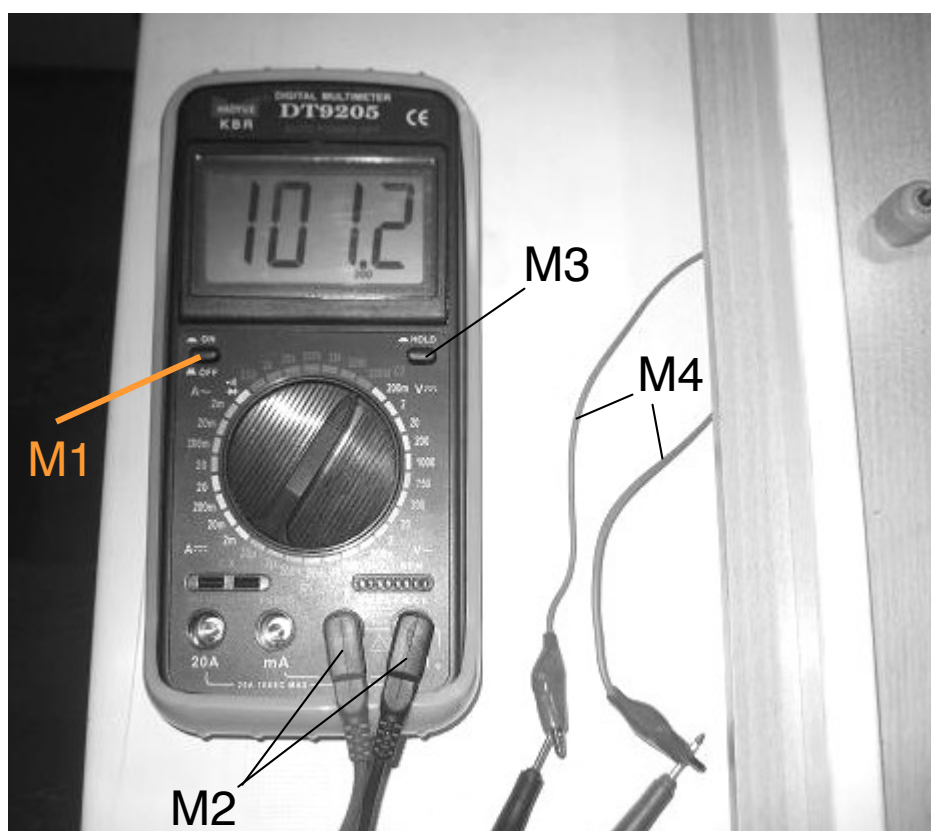


Figure 7. The Multimeter for measuring the resistance of the photoresistor. M1: on/off switch; M2: probe wires; M3: Hold button; M4: connections to the apparatus.

Note: The multimeter has auto-off feature. In the case of auto-off, you should push on/off button (M1) twice, successively.

❖ Hold button should not be active during the experiment.

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