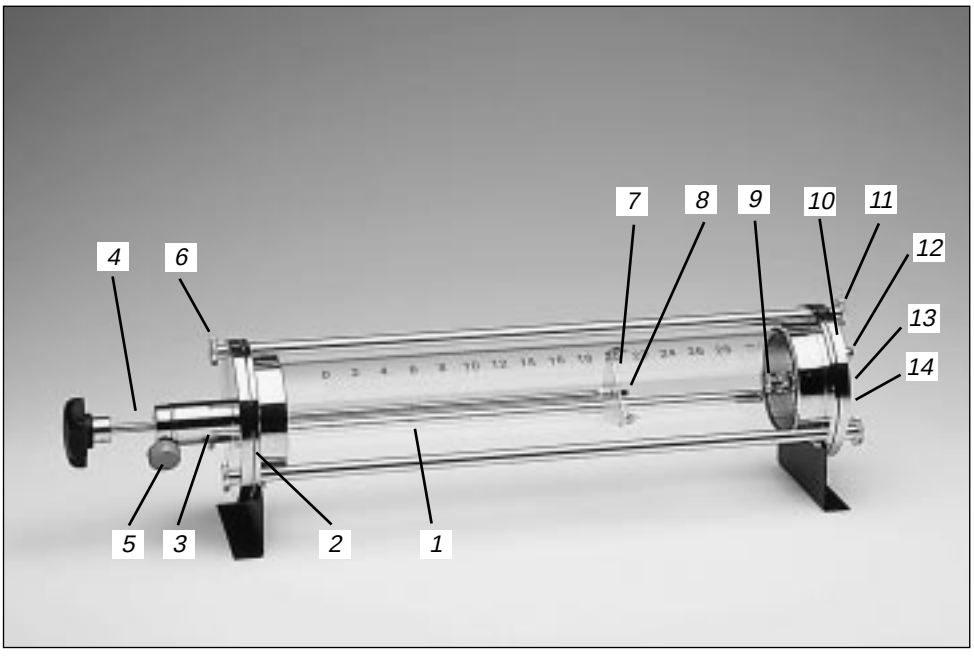
Container for nuclear physics experiments

09103.00

Operating Instructions



1 PURPOSE AND CHARACTERISTIC FEATURES

The container allows α-particles to be examined in a vacuum, and so uninfluenced. It is of particular use in experiments to determine their range in dependence on air pressure and to determine their energy, and for experiments on Rutherford scattering.

The container has a hose nipple for connection to a vacuum pump, so that it can be evacuated for such purposes. An α-detector can be mounted in the container, and a radioactive source can be fitted on a holder which can be moved in the direction of the axis. Various diaphragms can be inserted for scattering experiments (see List of Equipment).

2 FUNCTION ELEMENTS AND OPERATING ELEMENTS

2.1 Components of the container (see Fig. 1)

1 Cylindrical glass cylinder with a cm scale. It has metal flanges at each end, which are connected to each other by three spacing rods and have feet for standing

2 Flange cover with vacuum tight slide-sleeve *3*. The cover has an O-ring held in a groove and is screwed vacuum tight to the end of the cylinder with 3 milled nuts *6*

3 Slide-sleeve

4 Sliding rod with threaded tip *8* for screwing on a radioactive source

5 Milled screw to lock the sliding rod in position

7 Centering device for the sliding rod

8 M5 thread for screwing on a radioactive source

9 BNC plug for fitting on an α-detector

10 Flange cover with O-ring held in a groove; a major part of this is the M5 threaded pin for screwing on a radioactive source, for carrying out back-scattering experiments

11 Milled screws for holding the flange cover vacuum tight against the flange of the glass cylinder

12 Hose nipple for vacuum tube connection to a vacuum pump

13 BNC socket for connection of a pre-amplifier cable

14 Venting screw

2.2 Evacuating the container

First fit the α-detector and the radioactive source in position, then screw on the covers tightly onto the flanges at the ends of the glass cylinder by means of the milled nuts. When doing this, ensure that they are evenly tightened and that the O-rings are correctly seated in their grooves.

Before starting evacuation, check that the milled screw *5* is tightly closed. When the sliding rod is not tightly held, it could be drawn into the cylinder by the vacuum and so, under unfavourable circumstances, damage the α-detector. Close the venting screw, ensuring that the small O-rings are correctly seated.

According to the performance of the vacuum pump used, the container can be evacuated down to approx. 0.1 Pa (10^{-3} mbar).

Always only vent the container by means of the venting screw. When an oil-lubricated vacuum pump (rotary pump), insert a stop valve between the pump and the container. This prevents contamination of the container with pump oil, when the container is evacuated and the pump switched off.

3 SPECIFICATIONS

Diameter of cylinder	75 mm
Length of cylinder	400 mm
Lowest attainable pressure	approx. 0.1 Pa (10^{-3} mbar)

4 LITERATURE

Laboratory Experiments Physics	16502.12

5 LIST OF EQUIPMENT

Alpha detector	09100.00
Pre-amplifier for alpha detector	09100.10
Impulse height analyser	13725.93

For Rutherford scattering:

Annular diaphragm	09103.01
Annular diaphragm with gold foil	09103.02
Annular diaphragm with aluminium foil	09103.03

Components for generating and controlling the vacuum.