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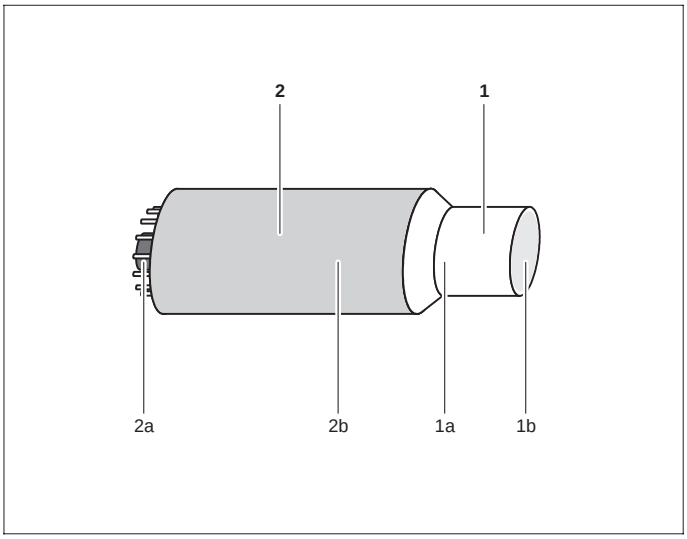


Instruction Sheet 559 901

Scintillation Counter (559 901)

1 NaI(Tl) crystal
aluminum housing (1a), aperture (1b)
2 Photomultiplier
base (2a), screening (2b)

1 Description

The scintillation counter enables detection of β, γ and x-ray radiation, intensity measurements, e.g. in absorption experiments, and registration of calibrated energy spectra for energy determinations.

It consists of a thallium-doped sodium iodide crystal which is permanently coupled to a photomultiplier. The crystal and photomultiplier are sealed light-tight in a thin aluminum housing. The photomultiplier is screened against interfering magnetic fields.

Safety notes

The NaI crystal of the scintillation counter is sensitive to severe mechanical shocks and greater temperature variations:

- While setting up the experiment, make sure that the scintillation counter cannot fall, and return it to a safe place after using.
- Avoid temperature variations greater than 5°C per hour.

2 Technical data

General data:

Type:	6 S 8 / 2 A (Harshaw)
Dimensions:	25 cm × 6 cm
γ energy range:	15 keV - 3 MeV
Energyresolution at 662 keV:	< 7.5%
β energy range:	550 keV - 3 MeV

Crystal:

Material:	NaI(Tl)
Diameter:	381 mm
Thickness:	50.8 mm

Aperture:

Material:	Aluminum
Thickness:	0.4 mm
Grounding:	190 mg cm-2

Photomultiplier:

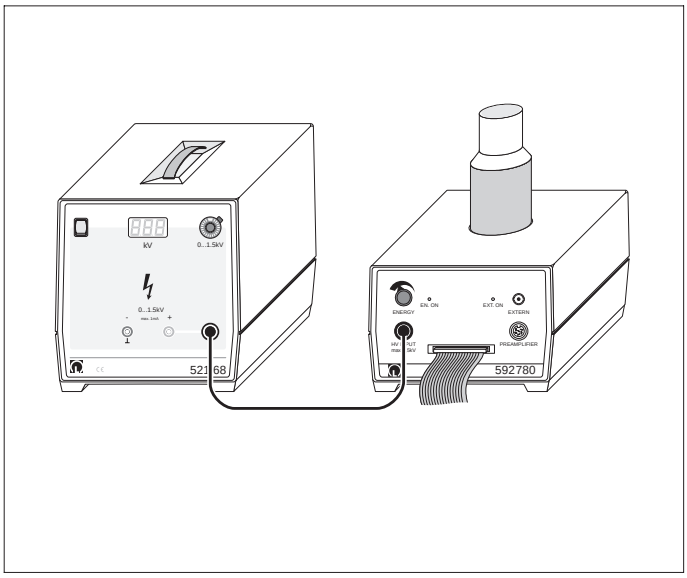
Diameter:	50.8 mm
Photocathode:	bialkali
Dynode material:	CsSb
Quantum efficiency:	22 %
Sensitivity maximum:	370 nm
Number of dynodes:	10
Maximum voltage between two dynodes:	300 V
Base:	14-pin

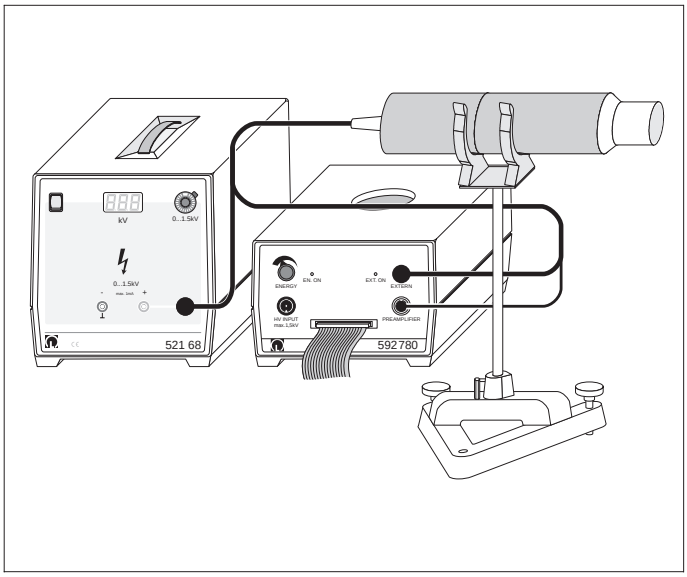
High voltage:

Operating voltage:	approx. 600-800 V
Polarity:	positive

3 Operation

3.1 Setup and connection





additionally required:

1 High voltage power supply, 1.5 kV	521 68
1 MCA-CASSY	529 780
1 Detector output stage (optional)	559 911
1 PC with MS-DOS-connector (524 007)	
1 Oscilloscope (optional)	

- Carefully mount the scintillation counter in the detector base socket of MCA-CASSY or the detector output stage (observe the orientation nub on the base).
- Connect the detector output stage to MCA-CASSY (where applicable).
- Set the 10-turn potentiometer to the zero position, switch on the high voltage power supply and slowly increase the voltage until the signal on the oscilloscope or PC monitor reaches the desired amplitude or channel.

3.2 Calibrating the scintillation counter

In quantitative measurements, you need to recalibrate the spectrometer each time the system is set up and each time the high voltage is changed. A two-point calibration should be carried out if possible.

The energy calibration exploits the linearity between the energy absorbed in the crystal and the pulse magnitude of the output signals. Suitable calibration substances are Am-241 ($E\gamma$ = 60 keV) for the energy range below 100 keV and Cs-137 ($E\gamma$ = 662 keV) for the energy range between 100 keV and 1.5 MeV.