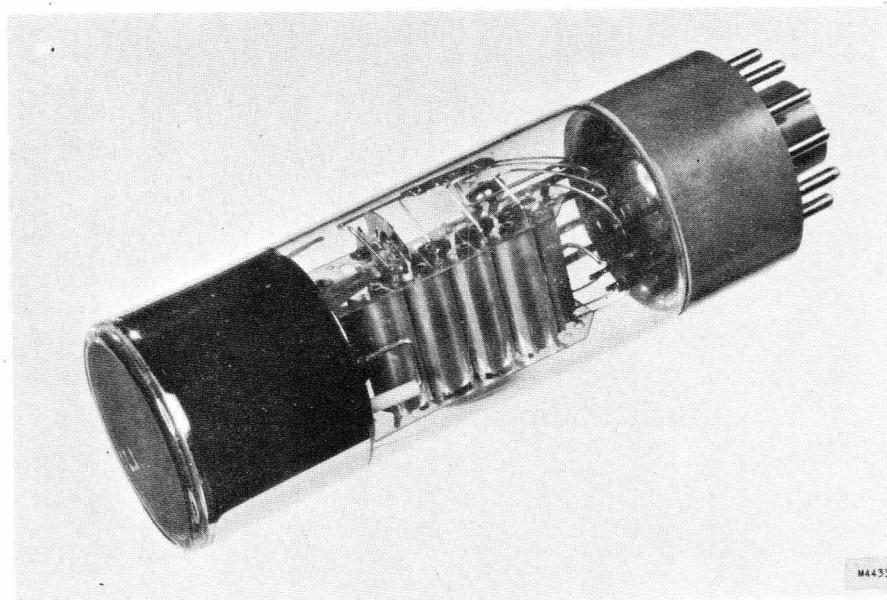


PHILIPS

XP1010

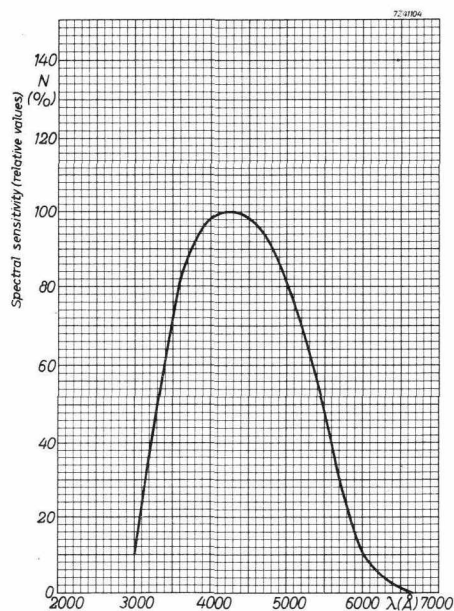
PHOTOMULTIPLIER



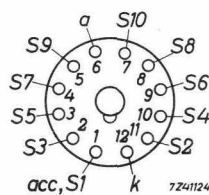
The XP1010 is a 10-stage photomultiplier tube provided with a caesium-antimony, semi-transparent flat cathode, which has a diameter of 32 mm.

The sensitive uniform photocathode has a typical sensitivity of $60 \mu\text{A}/\text{lm}$ and a spectral response that lies mainly in the visible region, with its maximum at $4200 \text{ \AA}$, as shown in the spectral response curve.

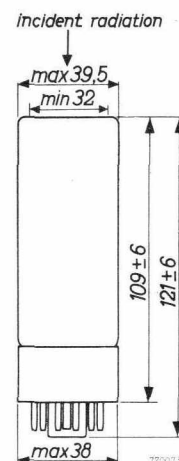
The tube is intended for use in applications such as X- and γ -ray spectrometry. With a $1'' \times 1''$ NaJ crystal the tube measures the Mn, K_{α} line (5.9 keV) with a plateau length of at least 70 V and a plateau slope of less than 8 % per 100 V (with the discriminator bias set at 0.2 V and at a counting rate of about 2500 c/s in the middle of the plateau). The background in the middle of the plateau is less than 50 c/s. As a rule the tube has an energy resolution of about 50 % for Cu, K_{α} (8 keV).



Spectral response



12-pins socket
type No. B8 700 42



Dimensions (in mm) and
electrode connections

μ -metal screening cylinder
type No. 56127

length	90	± 1	mm
diameter	42	± 1 $- 0$	mm

PHOTOCATHODE

Semi-transparent, head-on, flat surface

Cathode material

SbCs

Minimum useful diameter

32 mm

Wavelength at max. response

4200 $\pm$ 300 Å

Luminous sensitivity ¹⁾

avg. 60 μ A/lm
min. 35 μ A/lm

Radiant sensitivity ²⁾

avg. 50 mA/W

Dark current (at room temperature)

10⁻¹⁵ A/cm²

MULTIPLIER SYSTEM

Number of stages

10

Dynode material

AgMgOCs

Capacitance between anode
and final dynode

$C_{a-S10} = 3$ pF

Capacitance between anode
and all other electrodes

$C_a = 5$ pF

¹⁾ Measured with a tungsten ribbon lamp with a colour temperature of 2850 °K.

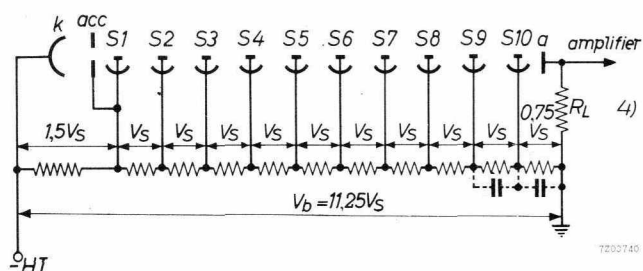
²⁾ At a wavelength of 4200 Å.

TYPICAL CHARACTERISTICS (voltage divider type A)

Anode sensitivity (at a total voltage of 1800 V)	$N_a =$ avg. 1250 A/lm
Anode dark current (at $N_a = 60$ A/lm)	min. 100 A/lm
Plateau length (Mn, K_{α} line 5.9 keV) ³⁾	max. 0.05 μ A
Plateau slope ³⁾	min. 70 V
Background in middle of plateau ³⁾	max. 8 % per 100 V
Linearity between anode pulse amplitude and input-light flux:	avg. 30 c/s
- with voltage divider type A	max. 50 c/s
- with voltage divider type B	up to 30 mA
	up to 100 mA

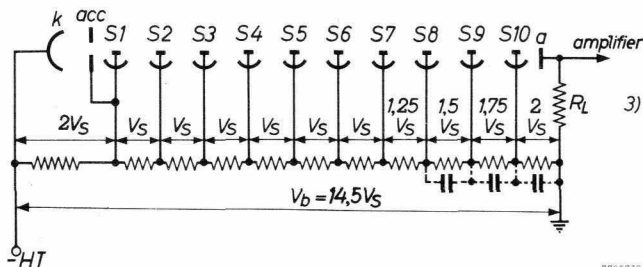
OPERATING CONDITIONS

Voltage divider type A



Voltage divider type B

k = cathode
 acc = accelerating
 electrode
 S_n = dynode No. n
 a = anode

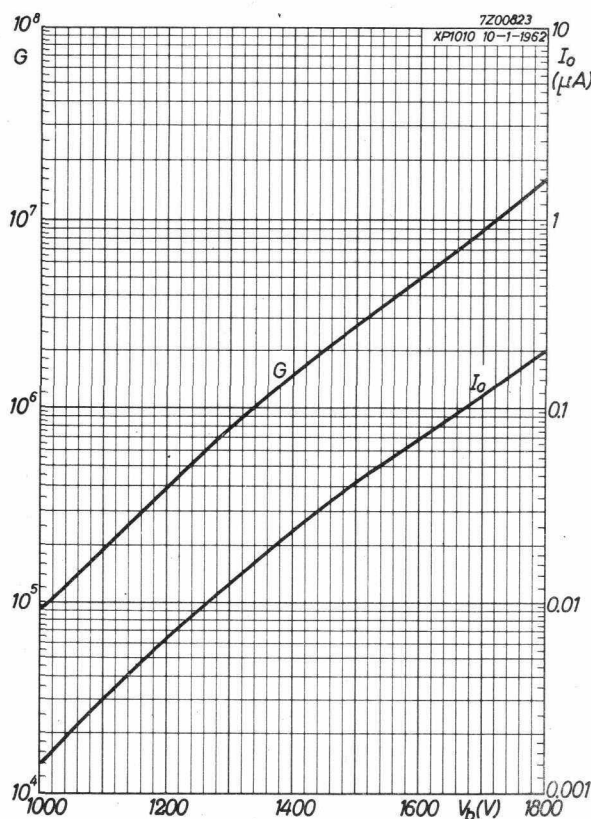


LIMITING VALUES

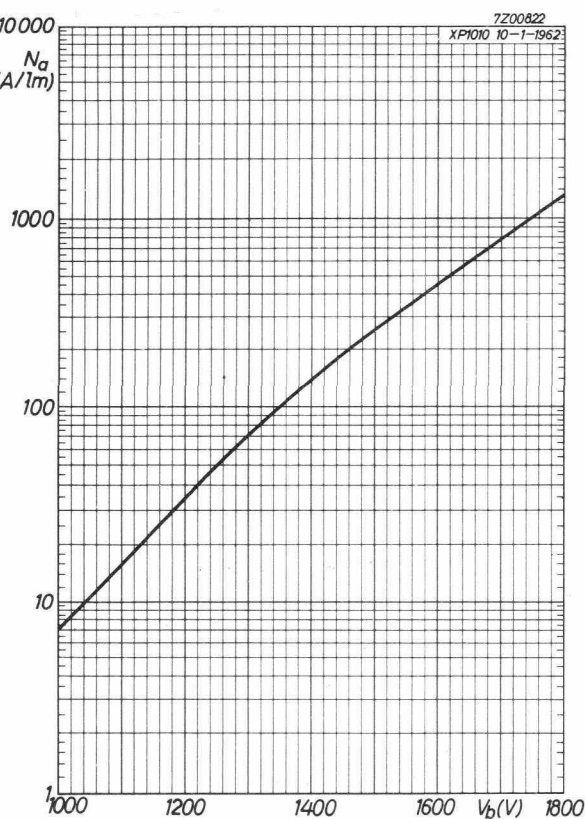
Total voltage	$V_b =$ max. 1800 V
Anode current at continuous operation (in order not to overload the tube)	$I_a =$ max. 1 mA
Anode dissipation	$W_a =$ max. 0.5 W
Voltage between cathode and first dynode	min. 120 V
	$V_{k-S1} =$ max. 500 V
Voltage between two consecutive dynodes	min. 80 V
	$V_{S_n-S_{n+1}} =$ max. 300 V
Voltage between S_{10} and anode	min. 80 V ⁴⁾
	$V_{a-S10} =$ max. 300 V

³⁾ Measured with a 1" x 1" NaJ crystal, at a counting rate of about 2500 c/s in the middle of the plateau, and with the discriminator bias set at 0.2 V.

⁴⁾ When calculating the anode voltage the voltage drop in the load resistance R_L should not be overlooked.



Gain and dark current



Overall sensitivity

OPERATIONAL CONSIDERATIONS

To achieve a stability of about 1 % the ratio of the current through the voltage-divider bridge to that through the heaviest loaded stage of the tube should be approx. 100.

For moderate intensities of radiation a bridge current of approx. 0.5 mA will be sufficient.

Different kinds of voltage dividers are possible. A circuit of type A results in the highest gain of the tube at a given total voltage; a circuit of type B gives higher currents in the last stages, but the total gain is less at the same total voltage.

When pulses with high amplitudes are taken from the anode, it is useful to decouple the last stages as indicated in the circuit by means of capacitors of a few hundred pF, to avoid a voltage drop between these stages.

When the tube has been exposed to full daylight just before mounting, it will probably show an increased dark current, which will be back at its normal value after several hours of operation.

It is advisable to screen the tube with a mu-metal cylinder against the influence of magnetic fields.