A low-voltage, low-noise, 11-stage, 29 mm (1 1/8") tube

Applications :	For high energy physics and scintillation counting where high gain good timing characteristics are required e.g. coincidence measurements and Cerenkov light detection.		
Description :	Window :	Material :	borosilicate glass
		Photocathode :	bi-alkali
		Refr. index at 420 nm :	1.48
	Multiplier :	Structure :	linear focused
		Nb of stages :	11
	Mass :	30 g	

Photocathode characteristics

	Spectral range :				270-650	nm
	Maximum sensitivity at :				420	nm
	Sensitivity ① :					
	Luminous :			typ.:	80	µA/lm
☑	Blue :	min.:	9	typ.:	11	µA/lmF
	Radiant, at 400 nm :			typ.:	95	mA/W

Characteristics with voltage divider A

	Gain slope (vs supp. volt., log/log) :				7.8	
	For an anode sensitivity of :				30	A/lmF
	Gain :				$2.7x10^6$	
☑	Supply voltage :	max.:	1100	typ.:	1000	V
		min.:	850			
☑	Anode dark current ② :	max.:	5	typ.:	1	nA
☑	Background noise ③ :	max.:	250	typ.:	100	cps
	Pulse height resolution ^{137}Cs ④ :			typ.:	7.7	%
	Single electron peak to valley ratio ⑤ :			typ.:	2	
	Mean anode sensitivity deviation ⑥ :					
	DC drift :			typ.:	5	%
	long term (16 h) :			typ.:	1	%
	after change of count rate :			typ.:	1	%
	vs temperature between 0 and +40°C at 400 nm :			typ.:	- 0.2	%/K
	Gain halved for a magnetic field of :					
	perpendicular to axis "n" :				0.4	mT
	parallel to axis "n" :				0.2	mT
	Linearity (2%) of anode current up to :				20	mA
	Anode pulse ⑦ at 1500 V :					
	Rise time :				3.4	ns
	Transit Time :				27	ns
	Capacitance anode to all dynodes :				5	pF

Recommended voltage divider

Type A for maximum gain

K	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	A	
2	1	1	1	1	1	1	1	1	1	1	1		(total : 13)

K: photocathode Dn: dynode A: anode

Limiting values

Anode luminous sensitivity :				max.:	500	A/lmF
Supply voltage :				max.:	1600	V
Continuous anode current :				max.:	0.2	mA
Voltage between :						
	D1 and photocathode :	min.:	80	max.:	350	V
	consecutive dynodes :			max.:	250	V
	anode and D11 :	min.:	30	max.:	300	V
Ambient temperature :						
	short operation (< 30 mn) :	min.:	-30	max.:	+80	°C
	continuous operation & storage :	min.:	-30	max.:	+50	°C

Notes

☑ Characteristic measured and mentioned on the test ticket of each tube.

① Luminous sensitivity is measured with a tungsten filament lamp with a colour temperature of 2856 ± 5 K. The blue radiant blue sensitivity expressed in A/lmF ("F" as filtered) is measured with a tungsten filament lamp with a colour of 2856 ± 5 K transmitted through a blue filter Corning Cs N°5-58, polished to half stock thickness.

② Dark current is measured at ambient temperature, after the tube has been in darkness for approximately 1 min. Lower value can be obtained after a longer stabilisation period in darkness (approx. 30 min.).

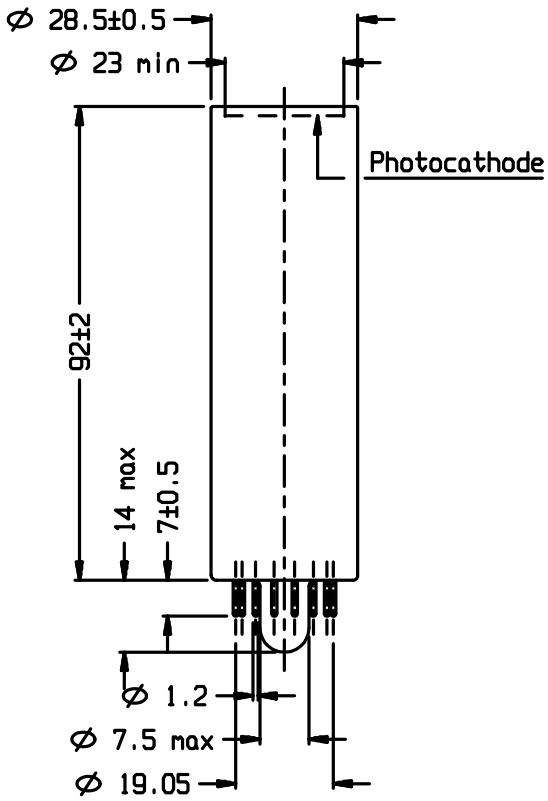
③ The background noise is measured with an output circuit and electronics with a bandwidth of 3 MHz above a threshold of 0.2 photoelectron.

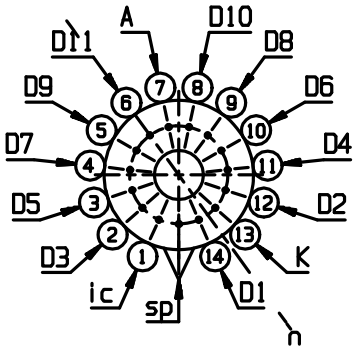
④ Pulse amplitude for ^{137}Cs is measured with NaI(Tl) cylindrical scintillator with a diameter of 25 mm and a height of 25 mm. The count rate used is ~ 10^4 cps.

⑤ The peak to valley ratio is calculated by dividing the single electron by the minimum vale to the left of the peak.

⑥ The mean pulse amplitude deviation is measured by coupling a NaI(Tl) scintillator to the window of the tube. Long term (16h) deviation is measured by placing a ^{137}Cs source at a distance from the scintillator so that the count rate is ~ 10^4 cps, corresponding to an anode current of ~ 300 nA. The mean pulse amplitude deviation after change of count rate is measured with a ^{137}Cs source at a distance from the scintillator so that the count rate can be changed from 10^4 to 10^3 cps corresponding to an anode current of ~ 1 µA and 0.1 µA respectively. Both tests are carried out according to ANSI-N42-9-1972 of IEEE recommendations.

⑦ Measured with a pulse light source, with a pulse duration (FWHM) of approximately 1ns., the cathode being completely illuminated. The rise time is determined between 10 % and 90 % of the anode pulse amplitude. The signal transit time is measured between the instant at which the illuminating pulse of the cathode becomes maximum, and the instant at which the anode pulse reaches its maximum. Rise time, pulse duration and transit time vary with respect to high tension supply voltage Vht as (Vht)-½.

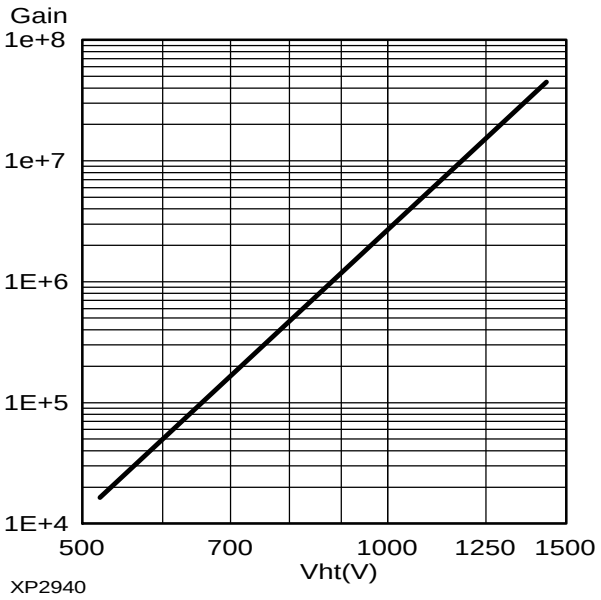




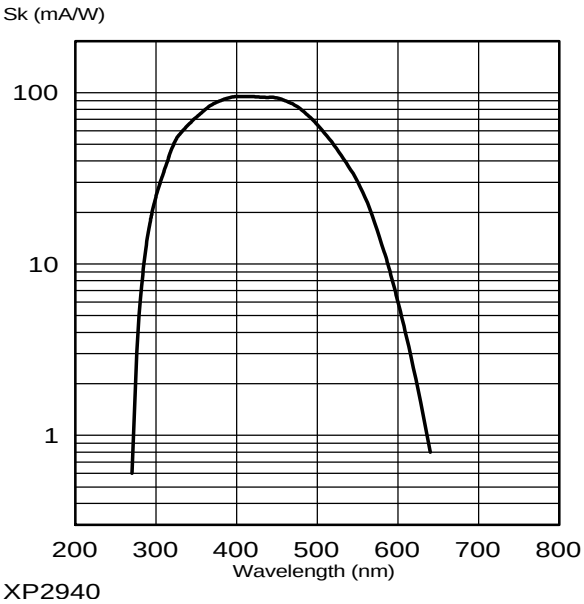
ref.: 99902312
sp: short pin
ic: internal connection
n: plane of symmetry of the multiplier

K: cathode Dn: dynode
A: anode

Typical gain curve



Typical spectral characteristics



Accessories

Socket for wires :	FE1114
Socket for PCB :	FE3114
Mu-metal shield :	MS179
Voltage divider :	VD1A9