

OSCILLOSCOPE TUBE with flat face, post deflection acceleration by means of a helical electrode, side contacts, metal-backed screen and high sensitivity for high frequency and high writing-speed applications

SCREEN

Type	Fluorescence	Phosphorescence	Persistence
D13-20BE (DB13-11)	Blue	Blue	Medium short

Useful screen diameter min. 114 mm

Useful scan at $V_{g7}/V_{g2,g4} = 6$

in the x direction 100 mm

in the y direction 40 mm

The useful scan may vertically be shifted max. 3 mm with respect to the geometric centre of the face plate

For further screen properties please refer to front of this section

HEATING

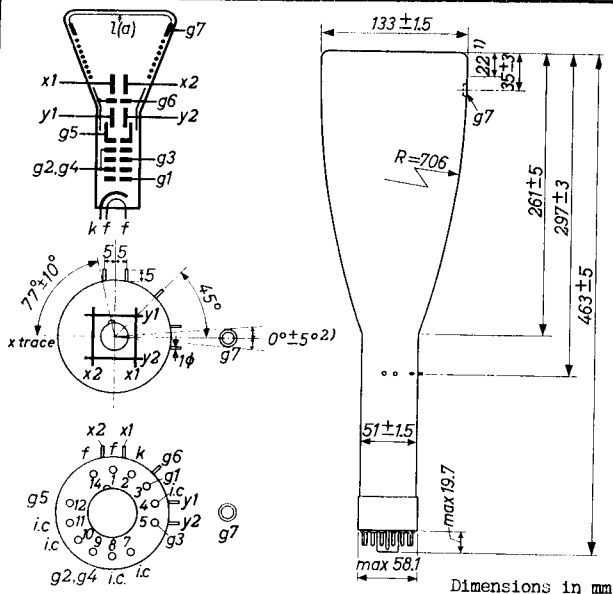
Indirect by A.C. or D.C., parallel supply

Heater voltage $V_f = 6.3 \text{ V}$

Heater current $I_f = 0.3 \text{ A}$

CAPACITANCES

Grid No.1 to all other electrodes	C_{g1}	= max. 6.0 pF
Cathode to all other electrodes	C_k	= max. 3.5 pF
x ₁ plate to all other electrodes except x ₂ plate	C_{x1}	= max. 2.8 pF
x ₂ plate to all other electrodes except x ₁ plate	C_{x2}	= max. 2.8 pF
y ₁ plate to all other electrodes except y ₂ plate	C_{y1}	= max. 3.0 pF
y ₂ plate to all other electrodes except y ₁ plate	C_{y2}	= max. 3.0 pF
x ₁ plate to x ₂ plate	C_{x1-x2}	= max. 1.9 pF
y ₁ plate to y ₂ plate	C_{y1-y2}	= max. 1.5 pF



Dimensions in mm

g5 = deflection plate shield

Base: DIHEPTAL 12 p

g6 = isolation shield

The post-accelerator helix is connected between g7 and g6
 The resistance of the helix is min. 200 MΩ

MOUNTING POSITION: any

The tube should not be supported by the base alone

ACCESSORIES

Socket	5914/20
Connector for side contacts	55561
Mu-metal shield	55551
Post-accelerator contact connector	55563

NET WEIGHT 910 g **Shipping weight** 2300 g

1) Straight part of the bulb

2) Location of the recessed cavity button contact with respect to the x-trace

<u>FOCUSING</u>	electrostatic
<u>DEFLECTION</u>	double electrostatic
x plates	symmetrical
y plates	symmetrical
Angle between x and y traces	$90^\circ \pm 10$

LINE WIDTH at the centre of the face plate

Post accelerator voltage	V_{G7}	=	24 kV
Grids No. 2 and 4 voltage	$V_{G2, G4}$	=	4 kV
Beam current	I_b	=	10 μ A
Line width	l.w.	=	0.2 mm

The line width is measured with the shrinking raster method

OPERATING CHARACTERISTICS

Post accelerator voltage	V_{G7}	=	24 kV
Isolation shield voltage	V_{G6}	=	4000 ± 400 V ¹⁾
Deflection plate shield voltage	V_{G5}	=	4000 ± 200 V ¹⁾
Accelerator voltage	$V_{G2, G4}$	=	4000 ± 200 V ¹⁾
Focusing electrode voltage	V_{G3}	=	800 to 1400 V
Grid No.1 voltage	V_{G1}	=	-120 to -192 V ²⁾
Deflection factor			
horizontal	M_x	=	67 to 80 V/cm
vertical	M_y	=	13.5 to 18.5 V/cm
Deviation of linearity of deflection		=	max. 2% ¹⁾³⁾
Pattern distortion			¹⁾⁴⁾
Undelected spot position	R	=	5 mm ⁵⁾

¹⁾²⁾³⁾⁴⁾⁵⁾ See page 4

- 1) In general the voltages on g_6 , g_5 , g_4 and the average potential of the deflection plates should be equal

Variation of the isolation shield voltage V_{g_6} (max. +10 % or -5 % of V_{g_2, g_4}) serves to correct pincushion and barrel pattern distortion

Adjustment of the deflection plate shield voltage V_{g_5} (max. ± 5 % of V_{g_2, g_4}) provides improved linearity of vertical deflection

A small potential difference (max. ± 5 % of V_{g_2, g_4} , obtained by varying V_{g_2, g_4}) between the y plates and grids No.2 and 4 may be desirable for obtaining optimum sharpness

- 2) For visual cut-off
- 3) The sensitivity for a deflection of less than 75% of the useful scan will not differ more than 2 % from the sensitivity for a deflection of 25 % of the useful scan
- 4) With a raster pattern the size of which is such that the widest points of the pattern just touch the sides of a rectangle of 80x40 mm, no points of the pattern sides will be within a concentric rectangle of 78x39mm
- 5) With the tube shielded the spot will be within a circle of 5 mm radius, the circle being centered with respect to the tube face

LIMITING VALUES (Absolute limits)

Post accelerator voltage	V_{g7}	= max. 24 kV = min. 6 kV
Isolation shield voltage	V_{g6}	= max. 4400 V
Deflection plate shield voltage	V_{g5}	= max. 4200 V
Accelerator voltage	$V_{g2, g4}$	= max. 4200 V = min. 1000 V
Focusing electrode voltage	V_{g3}	= max. 2000 V
Grid No.1 voltage		
negative	$-V_{g1}$	= max. 200 V
positive	$+V_{g1}$	= max. 0 V
peak positive	$+V_{g1 p}$	= max. 2 V
Voltage between cathode and heater		
cathode positive	$V_{kf(k pos)}$	= max. 200 V
cathode negative	$V_{kf(k neg)}$	= max. 125 V
Cathode current	I_k	= max. 1.5 mA(RMS)

CIRCUIT DESIGN VALUES

Grid No.1 circuit resistance	R_{g1}	= max. 1.5 M Ω
Resistance between any deflection plate and grids No. 2 and 4		See note 1)
Grid No.3 current (at $I_{g2, g4} = 1.5$ mA)	I_{g3}	= -15 to +10 μ A ²⁾

¹⁾ If use is made of the full deflection capabilities of the tube, the deflection plates will intercept part of the electron beam near the edge of the scan; a low impedance deflection plate drive is therefore desirable

²⁾ Values to be taken into account for the calculation of the V_{g3} -potentiometer

PHILIPS



*Electronic
Tube*

HANDBOOK

D13-20BE (DB13-11)

page	sheet	date
1	1	1963.02.02
2	2	1963.02.02
3	3	1963.02.02
4	4	1963.02.02
5	5	1963.02.02
6	FP	2000.01.21