

INSTRUMENT CATHODE-RAY TUBE

- 12 cm diagonal rectangular flat face
- domed mesh post-deflection acceleration
- internal magnetic lens system for correction of orthogonality, astigmatism and eccentricity
- low heater power consumption
- internal graticule
- high sensitivity and high brightness
- short overall length
- for compact oscilloscopes with up to 75 MHz bandwidth

QUICK REFERENCE DATA

Final accelerator voltage	$V_{g7(\ell)}$	10	16,5 kV
First accelerator voltage	V_{g4}	1,5	2,2 kV
Minimum useful scan area		80 mm x 64 mm	
Deflection coefficient			
horizontal	M_x	5,8	8,3 V/div
vertical	M_y	3,0	4,3 V/div

OPTICAL DATA

Screen	metal-backed phosphor
type	GH
colour	green
persistence	medium short
Useful screen area	≥ 82 mm x 66 mm; note 1 (last page but one)
Useful scan area	≥ 80 mm x 64 mm
Internal graticule	type 119; see Fig. 4

HEATING

Indirect by a.c. or d.c.*

Heater voltage	V_f	6,3 V
Heater current	I_f	0,1 A
Heating time to attain 10% of the cathode current at equilibrium conditions		approx. 7 s

* Not to be connected in series with other tubes.



MECHANICAL DATA**Dimensions and connections** (see also outline drawings)

Overall length (socket included) ≤ 299 mm
 Faceplate dimensions $98 \pm 0,5$ mm x $82 \pm 0,5$ mm

Net mass approx. 750 g

Base 12 pin, all glass, JEDEC B12-246

Mounting

The tube can be mounted in any position. It must not be supported by the socket and not by the base region alone. The reference points on adjoining edges of the faceplate (see Fig. 4) enable the tube to be mounted accurately in the front panel, thus providing optimum alignment of the internal graticule.

Accessories

Pin protector (required for shipping) supplied with tube
 Socket with solder tags type 55594
 Socket with printed-wiring pins type 55595
 Final accelerator contact connector type 55569/55597
 Mu-metal shield to be established

FOCUSING

electrostatic

DEFLECTION

x-plates double electrostatic
 y-plates symmetrical
 symmetrical

CAPACITANCES

x ₁ to all other elements except x ₂	C _{x1(x2)}	4,8 pF
x ₂ to all other elements except x ₁	C _{x2(x1)}	3,6 pF
y ₁ to all other elements except y ₂	C _{y1(y2)}	3,0 pF
y ₂ to all other elements except y ₁	C _{y2(y1)}	3,0 pF
x ₁ to x ₂	C _{x1x2}	3,3 pF
y ₁ to y ₂	C _{y1y2}	1,4 pF
Control grid to all other elements	C _{g1}	6,5 pF
Cathode to all other elements	C _k	3,2 pF
Focusing electrode to all other elements	C _{g3}	8,0 pF
Final accelerator electrode to all other elements	C _{g7}	140 pF

DEVELOPMENT DATA



DIMENSIONS AND CONNECTIONS

Dimensions in mm

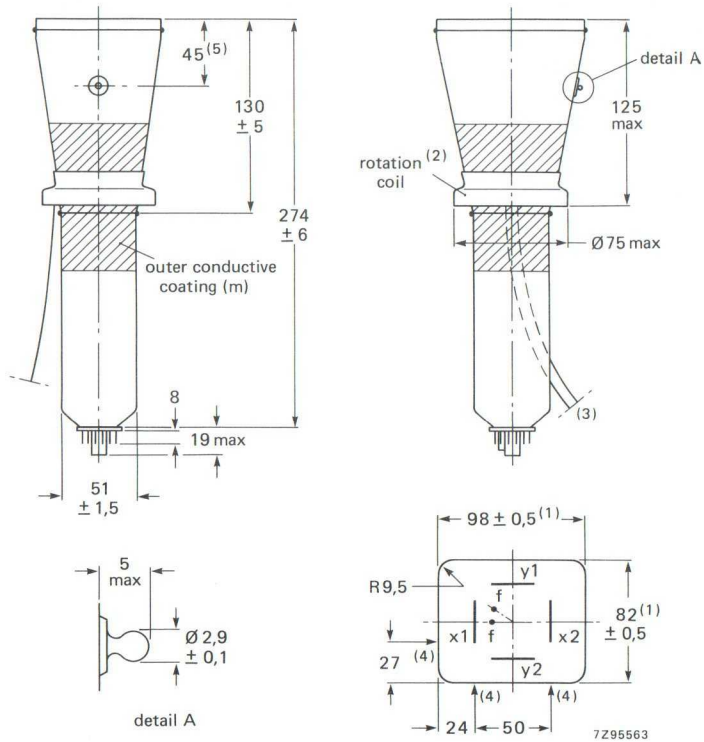


Fig. 1.

1. Dimensions of faceplate only. The complete assembly of faceplate and cone (frit seal included) will pass through an opening of 101 mm x 85 mm (diagonal 125 mm).
2. The coil is fixed to the envelope with resin and adhesive tape.
3. The length of the connecting leads of the rotation coil is min. 350 mm.
4. Reference points on faceplate for graticule alignment (see Fig. 4).
5. The centre of the final accelerator contact is situated within a square of 10 mm x 10 mm around the indicated position.

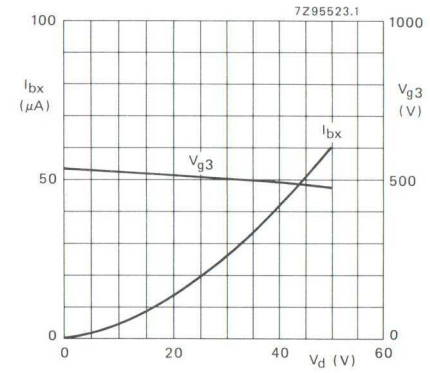


Fig. 5 Beam current (I_{bx}) and focusing voltage (V_{g3}) as a function of grid drive voltage (V_d) at $V_{g7} = 16,5$ kV, $V_{g5} = 2,2$ kV; typical curves.

I_{bx} is the beam current, without scan, measured on x2, when the deflection plate potentials have been adjusted to $V_{y1} = V_{y2} = 2200$ V, $V_{x1} = 1500$ V, $V_{x2} = 1900$ V, thus directing the total beam current to x2.

DEVELOPMENT DATA

NOTES

- As the frit seal is visible through the faceplate, and not necessarily aligned with the internal graticule, application of an external passe-partout with open area of max. 82 mm x 66 mm is recommended. The internal graticule is aligned with the faceplate by using the faceplate reference points (see Fig. 4).
- The deflection plates must be operated symmetrically; floating mean x- or y-potentials will result into non-uniform line width and geometry distortion. The mean x- and y-potentials should be equal; under this condition the tube will be within the specification without corrections for astigmatism and geometry. A range of $\Delta V_{g5} = -50$ to $+50$ V may be applied for pincushion/barrel correction. The tube features internal magnetic correction for orthogonality between x- and y-traces, spot shaping (astigmatism) and eccentricity calibration.
- For some applications a mean x-potential up to 50 V positive with respect to mean y-potential is inevitable. In this case V_{g5} must be made equal to mean x-potential, and a range of 0 to -25 V with respect to mean y-potential will be required on g4 for astigmatism correction. The circuit resistance for V_{g4} should be ≤ 10 k Ω .
- The sensitivity at a deflection of less than 75% of the useful scan will not differ from the sensitivity at a deflection of 25% of the useful scan by more than the indicated value.
- A graticule consisting of concentric rectangles of 80 mm x 64 mm and 78,4 mm x 62,4 mm is aligned with the internal graticule. With optimum trace rotation correction the edges of a raster will fall between these rectangles.
- The tube has a trace rotation coil, fixed onto the lower cone part. The coil has 1000 turns and a typical resistance of $185 \pm 25 \Omega$ at 20 °C, which increases by approx. 0,4%/K for rising temperature. At typical operation ($V_{g5} = 2200$ V, $V_{g7} = 16,5$ kV) approx. 6,5 mA causes 1° trace rotation. Thus maximum required voltage is approx. 13 V for tube tolerances ($\pm 5^\circ$) and earth magnetic field with reasonable shielding ($\pm 2^\circ$). The required current for 1° trace rotation is related to approx. $\sqrt{V_{g5}}$.
- Measured with the shrinking raster method in the centre of the screen under typical operating conditions, adjusted for optimum spot size at a beam current $I_L = 10 \mu A$.
- The X-ray dose rate remains below the acceptable value of 36 pA/kg (0,5 mR/h), when the tube is used within its limiting values (beam current $I_L \leq 100 \mu A$).

DIMENSIONS AND CONNECTIONS (continued)

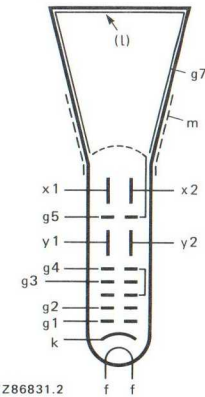
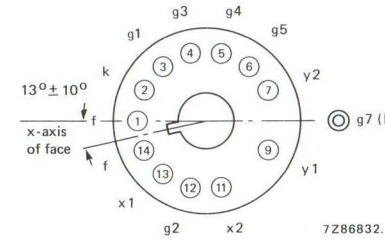


Fig. 2 Pin arrangement; bottom view.

Fig. 3 Electrode configuration.

DEVELOPMENT DATA

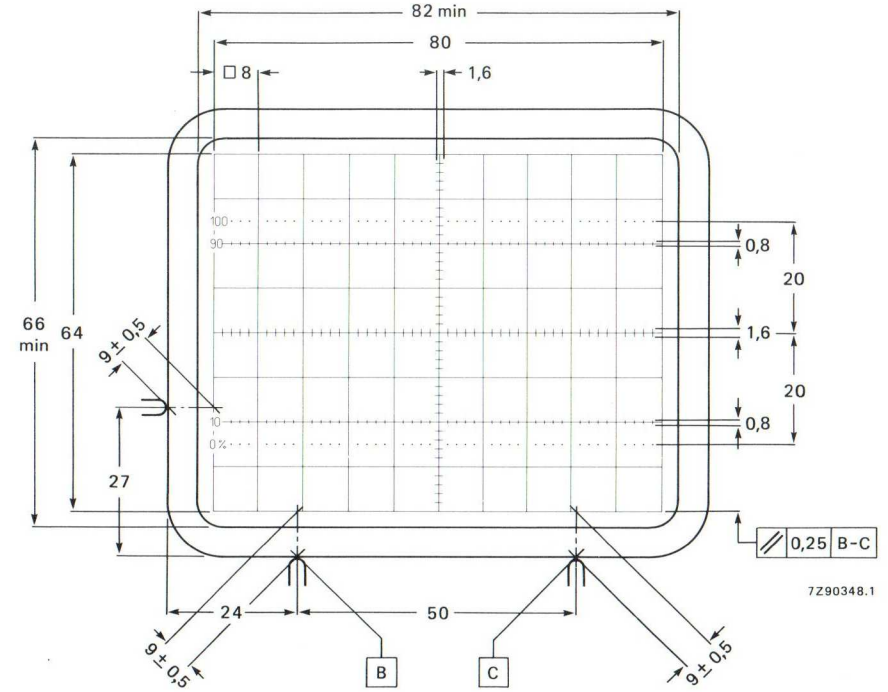


Fig. 4 Front view of tube with internal graticule, type 119 (final accelerator contact at right-hand side). The faceplate reference points are used for aligning the graticule with the faceplate. Line thickness = 0,2 mm; dot diameter = 0,4 mm; colour: red.

