Ok 20/1-'80 Sichmal

INSTRUMENT CATHODE-RAY TUBE

7 cm diagonal, rectangular flat faced monoaccelerator oscilloscope tube primarily intended for use in inexpensive oscilloscopes and monitoring devices.

QUICK REFERENCE DATA

Accelerator voltage	$V_{g2, g4, g5(\ell)}$	1000 V
Display area		60 x 36 mm²
Deflection coefficient		
horizontal	M_x	12,5 V/cm
vertical	M_y	20 V/cm

SCREEN

	colour	persistence
D7–220GH	green	medium short

Useful screen dimensions	⩾	60 x 36 mm
Useful scan		
horizontal	⩾	60 mm
vertical	⩾	36 mm
Spot eccentricity in horizontal and vertical directions	<	5 mm

HEATING

Indirect by a.c. or d.c.; parallel supply

Heater voltage	V_f	6,3 V
Heater current	I_f	300 mA

MECHANICAL DATA

Mounting position: any

The tube should not be supported by the base alone and under no circumstances should the socket be allowed to support the tube.

Net mass approx. 350 g

Base 12-pin all glass; JEDEC B12–246

Dimensions and connections

See also outline drawing		
Overall length	≤	225 mm
Face dimensions	≤	72,5 x 49 mm

Accessories

Socket, supplied with tube	type 55589
Mu-metal shield	type 55535

FOCUSING	electrostatic

DEFLECTION	double electrostatic
x-plates	symmetrical
y-plates	symmetrical
Angle between x and y-traces	$90 \pm 1^{\circ}$
→ Angle between x-trace and horizontal axis of the face	$\leqslant 3^{\circ}$ *

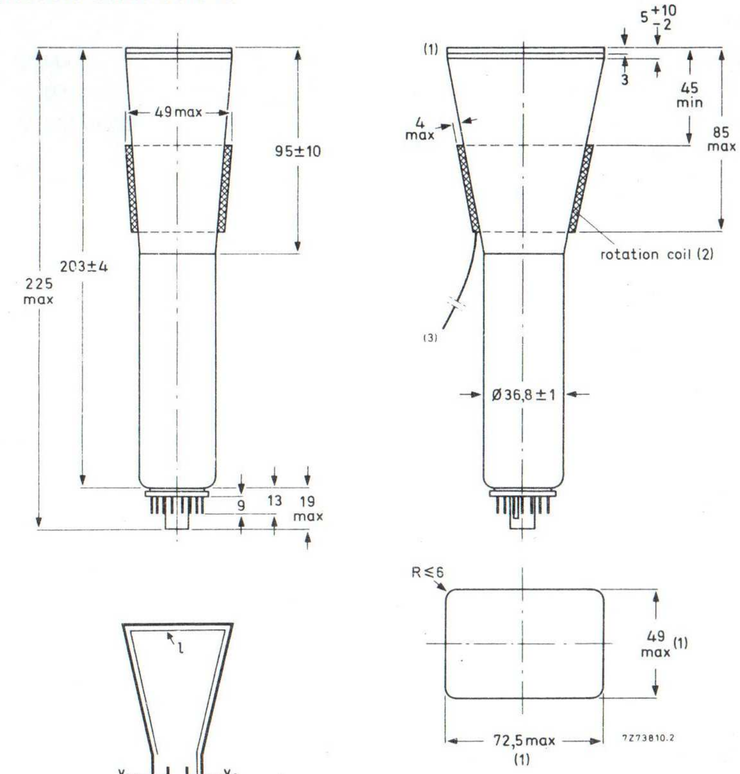
If use is made of the full deflection capabilities of the tube the deflection plates will block part of the electron beam, hence a low impedance deflection plate drive is desirable.

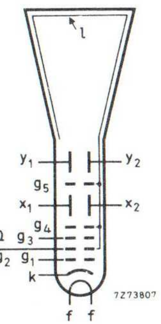
→ CAPACITANCES

x_1 to all other elements except x_2	$C_{x1(x2)}$	4,0 pF
x_2 to all other elements except x_1	$C_{x2(x1)}$	4,1 pF
y_1 to all other elements except y_2	$C_{y1(y2)}$	4,2 pF
y_2 to all other elements except y_1	$C_{y2(y1)}$	5,4 pF
x_1 to x_2	C_{x1x2}	1,6 pF
y_1 to y_2	C_{y1y2}	1,8 pF
Control grid to all other elements	C_{g1}	7,0 pF
Cathode to all other elements	C_k	5,0 pF

* The tube is provided with a rotation coil, concentrically wound around the tube neck, enabling the alignment of the x-trace with the mechanical x-axis of the screen. The coil has 1000 turns and a maximum resistance of 250 Ω. Under typical operating conditions, a maximum of 10 ampere-turns are required for the maximum rotation of 3°. This means the required current is 10 mA maximum at a required voltage of 2,5 V maximum.

DIMENSIONS AND CONNECTIONS

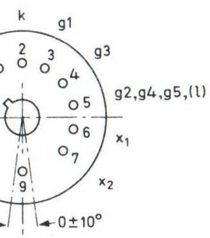




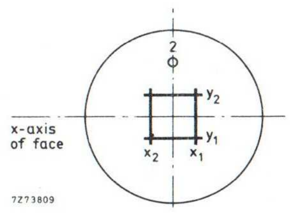
(1) The bulge at the frit seal does not exceed the maximum dimensions.

(2) The coil is fixed to the envelope by means of adhesive tape.

(3) The length of the connecting leads of the rotation coil is min. 350 mm.



bottom view



bottom view

TYPICAL OPERATION

Conditions (note 1)

Accelerator voltage	$V_{g2,\,g4,\,g5(\ell)}$	1000 V	
Astigmatism control voltage	$\Delta V_{g2,\,g4,\,g5(\ell)}$	±50 V	(note 2)
Focusing electrode voltage	V_{g3}	100 to 180 V	
Control grid voltage for visual extinction of focused spot	V_{g1}	⩽ −35 V	

Performance

Useful scan			
horizontal		> 60 mm	
vertical		> 36 mm	
Deflection coefficient			
horizontal	M_x	12,5 V/cm	
		< 13,8 V/cm	
vertical	M_y	20 V/cm	
		< 22 V/cm	
Line width	l.w.	0,28 mm	(note 3)
Deviation of linearity of deflection		< 2 %	(note 4)
Grid drive for 10 μA screen current		≈ 10 V	
Geometry distortion	see note 5		

LIMITING VALUES (Absolute maximum rating system)

Accelerator voltage	$V_{g2,\,g4,\,g5(\ell)}$	max.	2200 V
		min.	900 V
Focusing electrode voltage	V_{g3}	max.	2200 V
Control grid voltage	$-V_{g1}$	max.	200 V
		min.	0 V
Cathode to heater voltage			
positive	V_{kf}	max.	125 V
negative	$-V_{kf}$	max.	125 V
Grid drive, average		max.	20 V
Screen dissipation	W_ℓ	max.	3 mW/cm²

NOTES

1. The mean x-plate potential and the mean y-plate potential should be equal to $V_{g2,\,g4,\,g5(\ell)}$ (with astigmatism control voltage set to zero).
2. When putting the tube into operation the astigmatism control voltage should be adjusted only once for optimum spot size in the centre of the screen. The control voltage will be within the stated range, provided the conditions of note 1 are adhered to.
3. 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 μA.

   As the construction of the tube does not permit a direct measurement of the beam current, this current should be determined as follows.

   a) Under typical operating conditions, apply a small raster display (no overscan), adjust V_{g1} for a beam current of approx. 10 μA and adjust V_{g3} and $V_{g2,\,g4,\,g5(\ell)}$ for optimum spot quality at the centre of the screen.

   b) Under these conditions, but without raster, the deflection plate voltages should be changed to: $V_{x1} = V_{x2}$ = 1000 V; V_{y1} = 300 V; V_{y2} = 700 V, thus directing the total beam current to y_2. Measure the current on y_2 and adjust V_{g1} for I_{y2} = 10 μA.

   c) Set again for the conditions under a), without touching the V_{g1} control. The screen current of the resulting raster display is now 10 μA.

   d) Focus optimally in the centre of the screen (do not adjust the astigmatism control) and measure the line width.
4. 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.
5. A graticule, consisting of concentric rectangles of 57,0 mm x 33,0 mm and 56 mm x 31,6 mm is aligned with the electrical x-axis of the tube. The edges of a raster will fall between these rectangles.

INSTRUMENT CATHODE-RAY TUBE

7 cm diagonal, rectangular flat faced monoaccelerator oscilloscope tube primarily intended for use in inexpensive oscilloscopes and monitoring devices.

QUICK REFERENCE DATA

Accelerator voltage	$V_{g2, g4, g5 (\ell)}$	1000 V
Display area		60 x 36 mm^2
Deflection coefficient		
horizontal	M_x	12,5 V/cm
vertical	M_y	20 V/cm

SCREEN

	colour	persistence
D7–220GH	green	medium short

Useful screen dimensions	⩾	60 x 36 mm
Useful scan		
horizontal	⩾	60 mm
vertical	⩾	36 mm
Spot eccentricity in horizontal and vertical directions	<	5 mm

HEATING

Indirect by a.c. or d.c.; parallel supply

Heater voltage	V_f	6,3 V
Heater current	I_f	300 mA

MECHANICAL DATA

Mounting position: any

The tube should not be supported by the base alone and under no circumstances should the socket be allowed to support the tube.

Net mass approx. 350 g

Base 12-pin all glass; JEDEC B12–246

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Dimensions and connections

See also outline drawing

Overall length	≤	225 mm
Face dimensions	≤	72,5 x 49 mm

Accessories

Socket, supplied with tube	type 55589
Mu-metal shield	type 55535

FOCUSING electrostatic

DEFLECTION double electrostatic

x-plates	symmetrical
y-plates	symmetrical
Angle between x and y-traces	90 ± 1°
Angle between x-trace and horizontal axis of the face	≤ 3° *

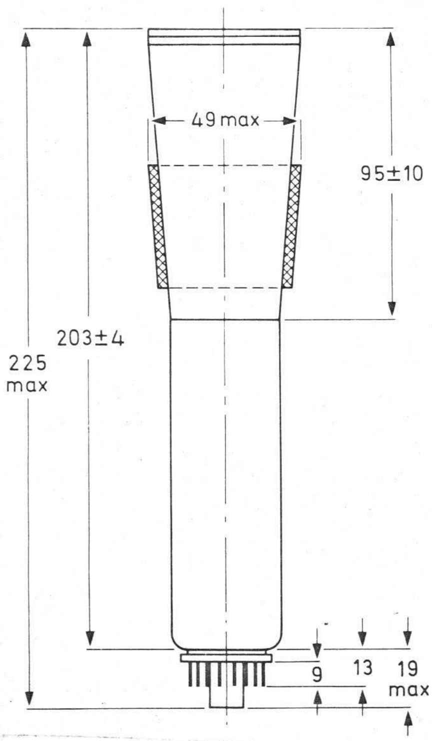
If use is made of the full deflection capabilities of the tube the deflection plates will block part of the electron beam, hence a low impedance deflection plate drive is desirable.

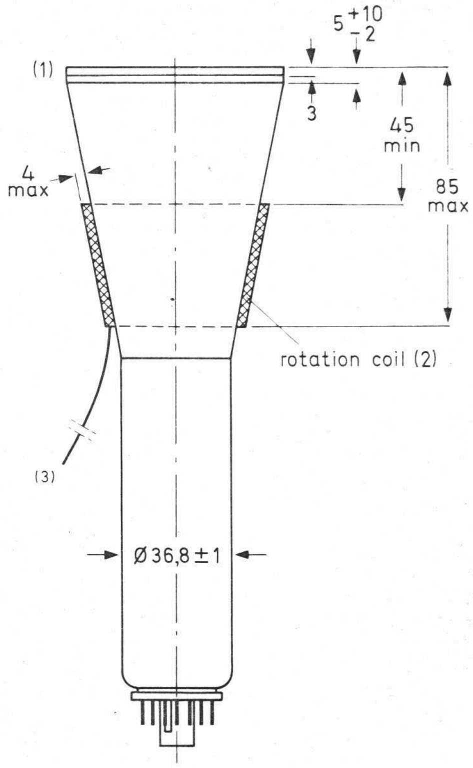
CAPACITANCES

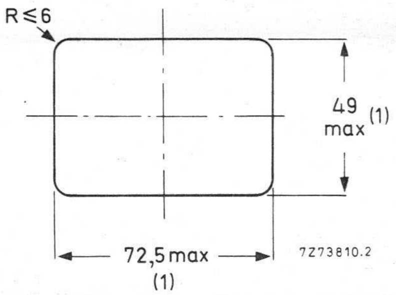
x_1 to all other elements except x_2	$C_{x1(x2)}$	4,0 pF
x_2 to all other elements except x_1	$C_{x2(x1)}$	4,1 pF
y_1 to all other elements except y_2	$C_{y1(y2)}$	4,2 pF
y_2 to all other elements except y_1	$C_{y2(y1)}$	5,4 pF
x_1 to x_2	C_{x1x2}	1,6 pF
y_1 to y_2	C_{y1y2}	1,8 pF
Control grid to all other elements	C_{g1}	7,0 pF
Cathode to all other elements	C_k	5,0 pF

* The tube is provided with a rotation coil, concentrically wound around the tube neck, enabling the alignment of the x-trace with the mechanical x-axis of the screen. The coil has 1000 turns and a maximum resistance of 250 Ω. Under typical operating conditions, a maximum of 10 ampere-turns are required for the maximum rotation of 3°. This means the required current is 10 mA maximum at a required voltage of 2,5 V maximum.

DIMENSIONS AND CONNECTIONS







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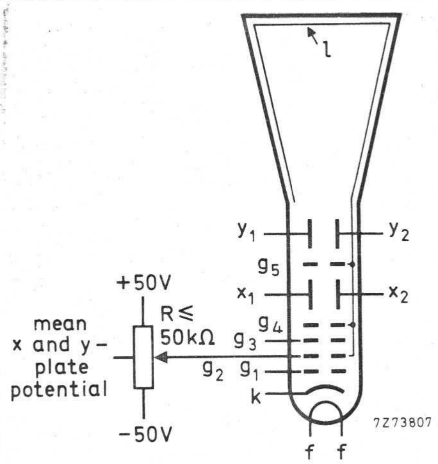
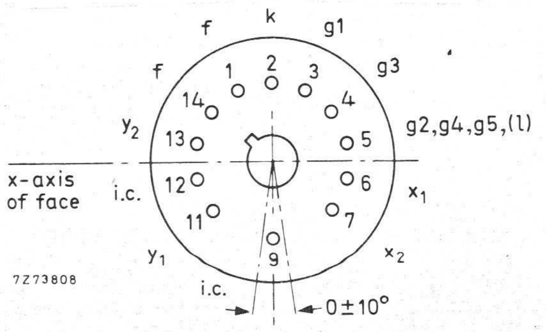


7Z73807

(1) The bulge at the frit seal does not exceed the maximum dimensions.

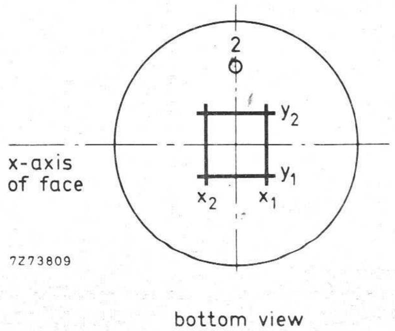
(2) The coil is fixed to the envelope by means of adhesive tape.

(3) The length of the connecting leads of the rotation coil is min. 350 mm.



7Z73808

bottom view



7Z73809

bottom view

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TYPICAL OPERATION

Conditions (note 1)

Accelerator voltage	$V_{g2, g4, g5(\ell)}$		1000 V	
Astigmatism control voltage	$\Delta V_{g2, g4, g5(\ell)}$		±50 V	(note 2)
Focusing electrode voltage	V_{g3}		100 to 180 V	
Control grid voltage for visual extinction of focused spot	V_{g1}	⩽	−35 V	

Performance

Useful scan				
horizontal		>	60 mm	
vertical		>	36 mm	
Deflection coefficient				
horizontal	M_x		12,5 V/cm	
		<	13,8 V/cm	
vertical	M_y		20 V/cm	
		<	22 V/cm	
Line width	l.w.		0,28 mm	(note 3)
Deviation of linearity of deflection		<	2 %	(note 4)
Grid drive for 10 μA screen current		≈	10 V	
Geometry distortion	see note 5			

LIMITING VALUES (Absolute maximum rating system)

Accelerator voltage	$V_{g2, g4, g5(\ell)}$	max.	2200 V
		min.	900 V
Focusing electrode voltage	V_{g3}	max.	2200 V
Control grid voltage	$-V_{g1}$	max.	200 V
		min.	0 V
Cathode to heater voltage			
positive	V_{kf}	max.	125 V
negative	$-V_{kf}$	max.	125 V
Grid drive, average		max.	20 V
Screen dissipation	W_{ℓ}	max.	3 mW/cm^2

NOTES

1. The mean x-plate potential and the mean y-plate potential should be equal to $V_{g2,\ g4,\ g5(\ell)}$ (with astigmatism control voltage set to zero).
2. When putting the tube into operation the astigmatism control voltage should be adjusted only once for optimum spot size in the centre of the screen. The control voltage will be within the stated range, provided the conditions of note 1 are adhered to.
3. 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 $I_\ell = 10\ \mu A$.

   As the construction of the tube does not permit a direct measurement of the beam current, this current should be determined as follows.
   a) Under typical operating conditions, apply a small raster display (no overscan), adjust V_{g1} for a beam current of approx. 10 μA and adjust V_{g3} and $V_{g2,\ g4,\ g5(\ell)}$ for optimum spot quality at the centre of the screen.
   b) Under these conditions, but without raster, the deflection plate voltages should be changed to: $V_{x1} = V_{x2} = 1000$ V; $V_{y1} = 300$ V; $V_{y2} = 700$ V, thus directing the total beam current to y_2. Measure the current on y_2 and adjust V_{g1} for $I_{y2} = 10\ \mu A$.
   c) Set again for the conditions under a), without touching the V_{g1} control. The screen current of the resulting raster display is now 10 μA.
   d) Focus optimally in the centre of the screen (do not adjust the astigmatism control) and measure the line width.
4. 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.
5. A graticule, consisting of concentric rectangles of 57,0 mm x 33,0 mm and 56 mm x 31,6 mm is aligned with the electrical x-axis of the tube. The edges of a raster will fall between these rectangles.

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INSTRUMENT CATHODE-RAY TUBE

7 cm diagonal, rectangular flat faced monoaccelerator oscilloscope tube primarily intended for use in inexpensive oscilloscopes and monitoring devices. This tube features a low heater power consumption.

QUICK REFERENCE DATA

Accelerator voltage	$V_{g2, g4, g5(\ell)}$	1000 V
Display area		60 x 36 mm^2
Deflection coefficient		
horizontal	M_x	12,5 V/cm
vertical	M_y	20 V/cm

The D7–221GH is equivalent to the type D7–220GH except for the following:

HEATING

Indirect by a.c. or d.c.; parallel supply

Heater voltage	V_f	6,3 V
Heater current	I_f	95 mA

LIMITING VALUES (Absolute maximum rating system)

Cathode to heater voltage			
positive	V_{kf}	max.	100 V
negative	$-V_{kf}$	max.	15 V
Control grid circuit resistance	R_{g1}	max.	1 MΩ

CAPACITANCES

Cathode to all other elements	C_k	3,7 pF

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INSTRUMENT CATHODE-RAY TUBE

7 cm diagonal, rectangular flat faced monoaccelerator oscilloscope tube primarily intended for use in inexpensive oscilloscopes and monitoring devices.

QUICK REFERENCE DATA			
Accelerator voltage	$V_{g2,g4,g5(\ell)}$	1000	V
Display area		60 x 36	mm^2
Deflection coefficient, horizontal	M_x	≈ 12,5 ~~13~~	V/cm
vertical	M_y	≈ 20 ~~21~~	V/cm

Blue Binder, Tab 4

SCREEN

	colour	persistence
D7-220GH	green	medium short

Useful screen dimensions	≥	60 x 36	mm
Useful scan, horizontal	≥	60	mm
vertical	≥	36	mm
Spot eccentricity in horizontal and vertical directions	<	5	mm

HEATING

Indirect by a.c. or d.c.; parallel supply

Heater voltage	V_f	6,3	V
Heater current	I_f	300	mA

MECHANICAL DATA

Mounting position: any

The tube should not be supported by the base alone and under no circumstances should the socket be allowed to support the tube.

Net mass	≈	350	g
Base		12-pin all glass; JEDEC B12-246	

Dimensions and connections

See also outline drawing

Overall length	≤	225	mm
Face dimensions	≤	72,5 x 49	mm

Accessories

Socket (~~adaptor~~ supplied with tube)	2412 500 00002
mu-metal shield	55535

FOCUSING electrostatic

DEFLECTION double electrostatic

x-plates	symmetrical
y-plates	symmetrical
Angle between x and y traces	90 ± 1°
Angle between x trace and horizontal axis of the face	see note 1

If use is made of the full deflection capabilities of the tube the deflection plates will block part of the electron beam, hence a low impedance deflection plate drive is desirable.

CAPACITANCES

x_1 to all other elements except x_2	$C_{x1(x2)}$	3,2	pF	✓
x_2 to all other elements except x_1	$C_{x2(x1)}$	3,4	pF	3,6
y_1 to all other elements except y_2	$C_{y1(y2)}$	4,9	pF	4,7
y_2 to all other elements except y_1	$C_{y2(y1)}$	4,7	pF	4,7
x_1 to x_2	C_{x1x2}	1,5	pF	✓
y_1 to y_2	C_{y1y2}	2,0	pF	1,8
Control grid to all other elements	C_{g1}	6,3	pF	6,6
Cathode to all other elements	C_k	4,7	pF	5

[1]) The tube is provided with a rotation coil, concentrically wound around the tube neck, enabling the alignment of the x-trace with the mechanical x-axis of the screen. The coil has a resistance of 260 Ω, and the maximum current required is 10 mA.

INSTRUMENT CATHODE-RAY TUBE

7 cm diagonal, rectangular flat faced monoaccelerator oscilloscope tube primarily intended for use in inexpensive oscilloscopes and monitoring devices.
This tube features a low heater power consumption.

QUICK REFERENCE DATA

Accelerator voltage	$V_{g2, g4, g5(\ell)}$	1000	V
Display area		60 x 36	mm²
Deflection coefficient, horizontal	M_x	12,5 ~~13~~	V/cm
vertical	M_y	20 ~~21~~	V/cm

Blue Binder, Tab 4

The D7-212GH is equivalent to the type D7-221GH except for the following:

HEATING

Indirect by a.c. or d.c.; parallel supply

Heater voltage	V_f	6,3	V
Heater current	I_f	95	mA

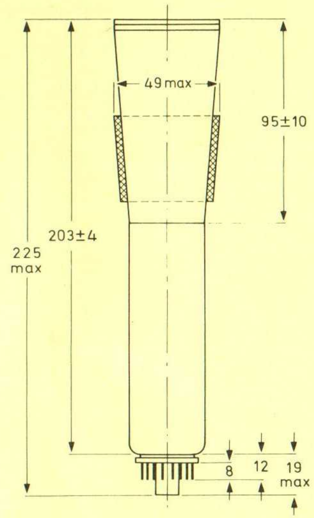
LIMITING VALUES (Absolute max. rating system)

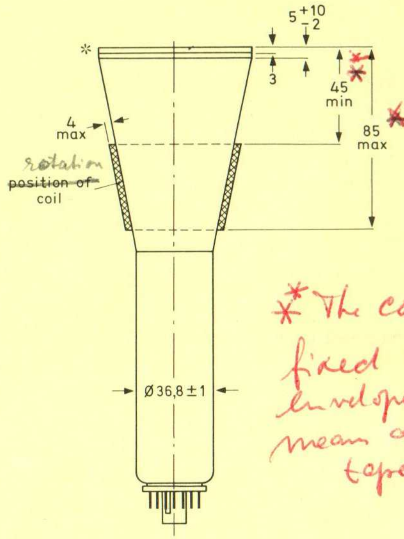
Cathode to heater voltage, positive	V_{kf}	max.	100	V
negative	$-V_{kf}$	max.	15	V

C_k 3 pF

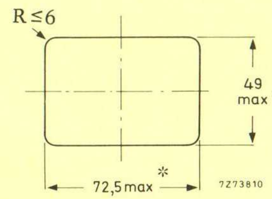
DIMENSIONS AND CONNECTIONS

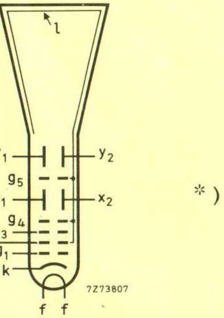
Dimensions in mm



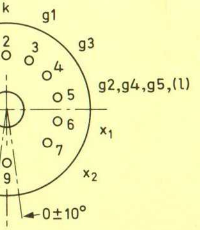


* The coil is fixed to the envelope by means of adhesive tape.

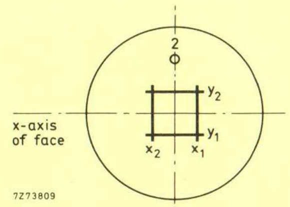




*) The bulge at the frit seal does not exceed the maximum dimensions.



bottom view



bottom view

TYPICAL OPERATION

Conditions [2]

Accelerator voltage	$V_{g2,g4,g5(\ell)}$		1000	V	
Astigmatism control voltage	$\Delta V_{g2,g4,g5(\ell)}$		± 50	V	[3]
Focusing electrode voltage	V_{g3}		90 to 170	V	
Control grid voltage for visual extinction of focused spot	V_{g1}	≤	-35	V	

Performance

Useful scan, horizontal		>	60	mm	
vertical		>	36	mm	
Deflection coefficient, horizontal	M_x	≈	12,5 ~~13~~	V/cm	< 13.8
vertical	M_y	≈	20 ~~21~~	V/cm	< 22
Line width	l.w.		0,28 ~~0,3~~	mm [4]	
Deviation of linearity of deflection		<	2	%	[5]
Grid drive for 10 μA screen current		≈	10	V	
Geometry distortion		see note 6			

LIMITING VALUES (Absolute max. rating system)

Accelerator voltage	$V_{g2,g4,g5(\ell)}$	max.	2200	V
		min.	900	V
Focusing electrode voltage	V_{g3}	max.	2200	V
Control grid voltage	$-V_{g1}$	max.	200	V
		min.	0	V
Cathode to heater voltage	V_{kf}	max.	125	V
	$-V_{kf}$	max.	125	V
Grid drive, average		max.	20	V
Screen dissipation	W_ℓ	max.	3	mW/cm^2

R_{g1} max 1 MΩ

Notes see page 5.

NOTES

[2] The mean x-plate potential and the mean y-plate potential should be equal to $V_{g2,g4,g5(\ell)}$ (with astigmatism control voltage set to zero).

[3] When putting the tube into operation the astigmatism control voltage should be adjusted only once for optimum spot size in the centre of the screen. The control voltage will be within the stated range, provided the conditions of note 2 are adhered to.

[4] 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 μA.

As the construction of the tube does not permit a direct measurement of the beam current, this current should be determined as follows:

a) under typical operating conditions, apply a small raster display (no overscan), adjust V_{g1} for a beam current of approx. 10 μA and adjust V_{g3} and $V_{g2,g4,g5(\ell)}$ for optimum spot quality at the centre of the screen.

b) under these conditions, but without raster, the deflection plate voltages should be changed to: $V_{x1} = V_{x2}$ = 1000 V; V_{y1} = 550 V 300 V; V_{y2} = 700 V, thus directing the total beam current to y_2.
Measure the current on y_2 and adjust V_{g1} for I_{y2} = 10 μA.

c) set again for the conditions under a), without touching the V_{g1} control.
The screen current of the resulting raster display is now ~~exactly~~ 10 μA.

d) focus optimally in the centre of the screen (do not adjust the astigmatism control) and measure the line width.

[5] 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.

[6] A graticule, consisting of concentric rectangles of 57,0 mm x 33,0 mm and 55,8 mm x 32,0 mm is aligned with the electrical x axis of the tube. The edges of a raster will fall between these rectangles.