INSTRUMENT CATHODE-RAY TUBE

14 cm diagonal rectangular flat-faced monoaccelerator oscilloscope tube primarily intended for use in inexpensive oscilloscopes and read-out devices.

QUICK REFERENCE DATA			
Accelerator voltage	$V_{g2, g4, g5(\ell)}$	2000	V
Display area		100 x 80	mm^2
Deflection coefficient, horizontal	M_x	≈ 24	V/cm
vertical	M_y	≈ 13,5	V/cm

SCREEN

	colour	persistence
D14-250GH	green	medium short

Useful screen dimensions	≥	100 x	80	mm
Useful scan, horizontal	≥		100	mm
vertical	≥		80	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.

Dimensions and connections

See also outline drawing

Overall length (socket included)	≤		333	mm
Face dimensions	≤	121 x	100	mm
Net mass		≈	750	g
Base			14-pin all glass	

Blue Binder, Tab 4

Accessories

Socket (supplied with tube)	type	55566
Mu-metal shield	type	

FOCUSING	electrostatic
DEFLECTION	double electrostatic
x-plates	symmetrical
y-plates	symmetrical

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.

Angle between x and y traces	$90^o \pm 1^o$
Angle between x-trace and horizontal axis of the face	see note 1)

CAPACITANCES

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

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 1000 turns and a resistance of 400 Ω. Under typical operating conditions, max. 30 ampere turns are required for the max. rotation of 5°. This means: the required current is max. 30 mA at a required voltage of 12 V.

INSTRUMENT CATHODE-RAY TUBE

14 cm diagonal rectangular flat-faced monoaccelerator oscilloscope tube primarily intended for use in inexpensive oscilloscopes and read-out devices.
This tube features a low heater power consumption.

QUICK REFERENCE DATA				
Accelerator voltage	$V_{g2, g4, g5(\ell)}$		2000	V
Display area			100 x 80	mm^2
Deflection coefficient, horizontal	M_x	≈	24	V/cm
vertical	M_y	≈	13,5	V/cm

The D14-251GH is equivalent to the type D14-250GH 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

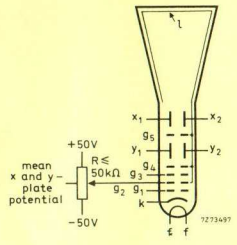
LIMITING VALUES (Absolute max. rating system)

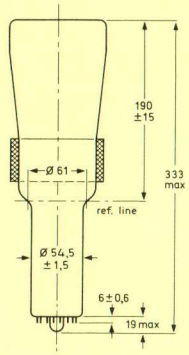
Cathode to heater voltage, positive	V_{kf}	max.	100	V
negative	$-V_{kf}$	max.	15	V

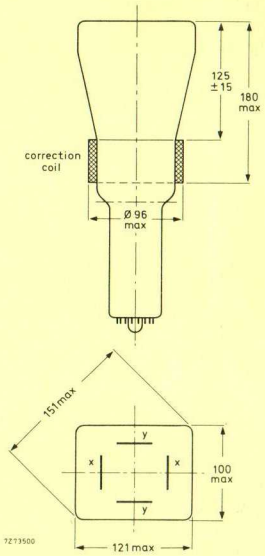
Blue Binder, Tab 4

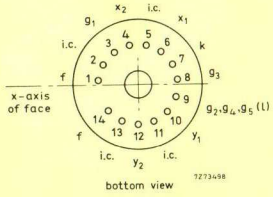
DIMENSIONS AND CONNECTIONS

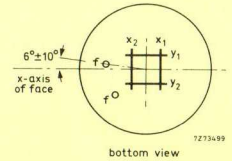
Dimensions in mm











TYPICAL OPERATION

Conditions [1]

Accelerator voltage	$V_{g2, g4, g5(\ell)}$		2000	V
Astigmatism control voltage	$\Delta V_{g2, g4, g5(\ell)}$		±50	V [2]
Focusing electrode voltage	V_{g3}	≈	300	V
Control grid voltage for visual extinction of focused spot	V_{g1}	≤	-65	V

Performance

Useful scan, horizontal		≥	100	mm
vertical		≥	80	mm
Deflection coefficient, horizontal	M_x	≈	24	V/cm
vertical	M_y	≈	13,5	V/cm
Line width	l.w.	≈	0,35	mm [3]
Deviation of linearity of deflection		≤	2	% [4]
Grid drive for 10 μA screen current		≈	10	V

LIMITING VALUES (Absolute max. rating system)

Accelerator voltage	$V_{g2, g3, g4(\ell)}$	max.	2200	V
		min.	1500	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 see page 5.

D14-250GH

NOTES

1) The mean x-plate potential and certainly 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: $V_{y1} = V_{y2}$ = 2000 V; V_{x1} = 1300 V; V_{x2} = 1700 V, thus directing the total beam current to x_2.
Measure the current on x_2 and adjust V_{g1} for I_{x2} = 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.

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.

INSTRUMENT CATHODE-RAY TUBE

14 cm diagonal rectangular flat faced monoaccelerator oscilloscope tube primarily intended for use in inexpensive oscilloscopes and read-out devices.

QUICK REFERENCE DATA

Accelerator voltage	$V_{g2, g4, g5 (\ell)}$	2000	V
Display area		100 x 80	mm^2
Deflection coefficient			
horizontal	M_x	23	V/cm
vertical	M_y	13,5	V/cm

SCREEN

	colour	persistence
D14-250GH	green	medium short

Useful screen dimensions	⩾	100 x 80	mm^2
Useful scan			
horizontal	⩾	100	mm
vertical	⩾	80	mm
Spot eccentricity in horizontal and vertical directions	<	7	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. 1000 g
Base	14-pin all glass

Dimensions and connections

See also outline drawing

Overall length (socket included)	⩽	333 mm
Face dimensions	⩽	121 x 100 mm

Accessories

Socket (supplied with tube)	type 55566
Mu-metal shield	type 55590

FOCUSING electrostatic

DEFLECTION double electrostatic

x-plates	symmetrical
y-plates	symmetrical

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.

Angle between x and y-traces		$90^o \pm 1^o$
Angle between x-trace and horizontal axis of the face	see footnote	

CAPACITANCES

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

max 400 Ω

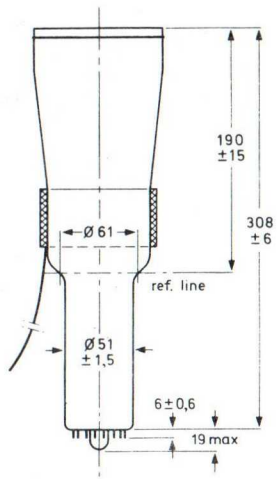
Note

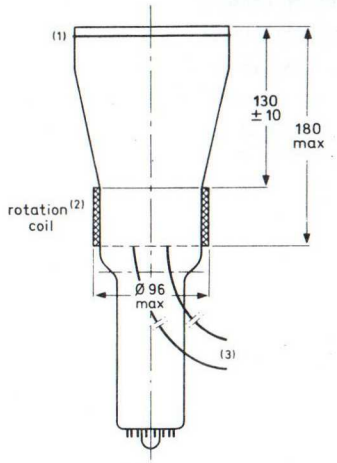
The tube is provided with a rotation coil, concentrically wound around the tube neck, enabling the alignment of the x-trace with the mechanical x-axis of the screen. The coil has 1000 turns and a resistance of 400 Ω. Under typical operating conditions, max. 30 ampere-turns are required for the max. rotation of 5°. This means the required current is max. 30 mA at a required voltage of 12 V.

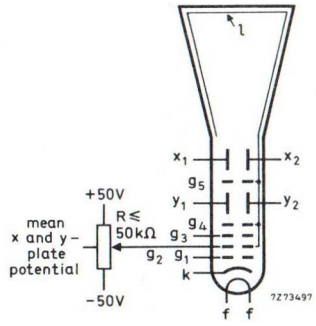
max

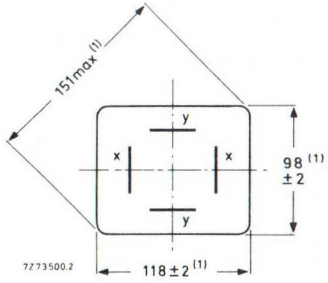
DIMENSIONS AND CONNECTIONS

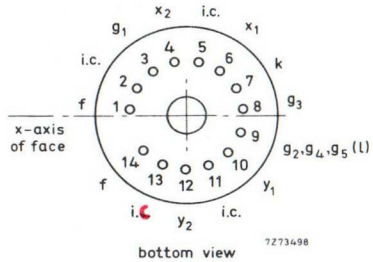
Dimensions in mm

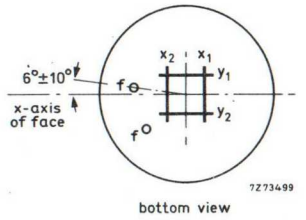












(1) The bulge at the frit seal may increase the indicated maximum dimensions by not more than 2 mm.
(2) The coil is fixed to the envelope by means of adhesive tape.
(3) The length of the connecting leads of the rotation coil is min. 350 mm.

TYPICAL OPERATION

Conditions (note 1)

Accelerator voltage	$V_{g2, g4, g5(\ell)}$		2000	V	
Astigmatism control voltage	$\Delta V_{g2, g4, g5(\ell)}$		± 50	V	(note 2)
Focusing electrode voltage	V_{g3}		220 to 370	V	
Control grid voltage for visual extinction of focused spot	V_{g1}	⩽	−65	V	

Performance

Useful scan					
horizontal		⩾	100	mm	
vertical		⩾	80	mm	
Deflection coefficient					
horizontal	M_x		23	V/cm	
		<	25	V/cm	
vertical	M_y		13,5	V/cm	
		<	15	V/cm	
Line width	l.w.	≈	0,35	mm	(note 3)
Deviation of linearity of deflection		⩽	2	%	(note 4)
Geometry distortion		see note 5			
Grid drive for 10 μA screen current		≈	10	V	

LIMITING VALUES (Absolute maximum rating system)

Accelerator voltage	$V_{g2, g4, g5(\ell)}$	max.	2200	V	
		min.	1500	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 see page 5.

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: $V_{y1} = V_{y2}$ = 2000 V; V_{x1} = 1300 V; V_{x2} = 1700 V, thus directing the total beam current to x_2.
Measure the current on x_2 and adjust V_{g1} for I_{x2} = 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 95 mm x 75 mm and 93 mm x 73 mm is aligned with the electrical x-axis of the tube. With optimum correction potentials applied a raster will fall between these rectangles.