

TH 9892 1" VIDICON

- MAGNETIC FOCUS AND DEFLECTION
- HIGH RESOLUTION (1000 T.V. LINES)
 - NORMAL SENSITIVITY
- EXCELLENT LIGHT INTEGRATION
- FOR SLOW SCAN OR DELAYED READOUT

The TH 9892 is a photoconductive camera tube of the Vidicon type designed for narrow bandpass transmission where the tube is scanned at low frame rate. It permits also integration and storage of input image information and delayed signal readout after a more or less long period of storage.

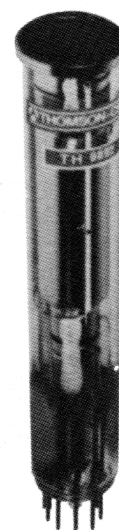
The TH 9892 includes a photoconductive target made with a high electrical resistivity material which allows for a relaxation time large enough to permit frame scan period of several seconds. When operated at 25 images per second, tube sensitivity is equivalent to that of Vidicon TH 9808 (250 μ A/lumen). At slow scanning rate, its sensitivity is about the same and signal current is a linear function of exposure time ; so, a signal current of 20 nA can be obtained for an exposure of 1 lux.s. (0.1 fc.s.). A good quality image is obtained within a dynamic range of 10^{-2} to 10 lux.s. (10^{-3} to 1 fc.s.) for scanning rate of 1 to some tens seconds. The gamma near to 1 allows for a very good integration of charges and the tube output current is found to remain approximately constant, at a given readout rate, if the product of target illumination and exposure time is constant.

The very high resistivity of the photoconductive layer permits also to maintain useful resolution for long storage of gathered charges.

Due to these characteristics, TH 9892 is particularly well suited for slow scan operation including three sequences : a short exposure time, a storage period and a long period of signal generation allowing for a high signal to noise ratio corresponding to narrow band-pass. Readout can be made immediately after the exposure time or delayed. The three sequences (exposure, storage, readout) can be recurrent or intermittent. For recurrent operation, the response rate of the photoconductive layer is satisfactory and similar to that obtained for 25 images/second scanning. For intermittent operation, in which an apparent decrease of sensitivity is observed, an erasure preceding a new exposure can be necessary to diminish the residual signal.

Due to these characteristics, TH 9892 is well adapted for slow or very slow scan pick-ups requiring a high resolution, such as for space applications. TH 9892 is also suited for narrow band-pass transmission (data transmission in which high signal to noise ratio is imperative) or very narrow band-pass (transmission of video information over telephone lines).

The excellent light integration and storage characteristics make the Vidicon TH 9892 ideal for televising at low light levels. The light from poorly illuminated scenes is gathered over a period of time and thus serves to increase output signal while a good resolution capability is maintained.




THOMSON-CSF
 GROUPEMENT TUBES ELECTRONIQUES

GENERAL CHARACTERISTICS

Electrical

Cathode	for unipotential cathode indirectly heated
Heater :	
- voltage	6.3 V
- current at 6.3 V	0.135 to 0.165 A
Minimum preheating time	60 s
Output capacitance :	
- signal electrode to all other electrodes	4.5 pF
Spectral response	see curve
Focus mode	electromagnetic
Deflection mode	electromagnetic

Mechanical

Overall length	max.	164 mm (6.46")
Overall diameter	max.	29 mm (1.14")
Bulb diameter	max.	26.7 mm (1.03")
Base (Ditetrar, 8 pins)		UTE 9 C 15 (JEDEC N° E8 - 11) METOX N° 30.250
Socket (note 1)		GERHARD type BV 200 - 1k1 GERHARD type BV 80/3 CLEVELAND type VYFA - 355.2 or equivalent
{ Deflecting yoke - Focusing coil assembly (note 2)		
{ Alignment coil (note 2)		
or Deflecting yoke - Focusing coil - Alignment coil assembly (note 2).		
Photoconductive layer :		
- maximum useful image diameter (4 x 3 aspect ratio)		16 mm
- rectangular frame, max.		9.5 mm x 12.7 mm
- square frame, max.		11 mm x 11 mm
- orientation of quality area :		
horizontal scan parallel to plane passing through the tube axis and short index pin (note 3)		
Operating mounting		any
Net weight, approx.		60 g

OPERATING CONDITIONS

(all potentials are referred to cathode)

Maximum ratings : (absolute values)

Electrode g4 (post-acceleration electrode)	1 000	V
Electrode g3 voltage (wall electrode)	1 000	V
Electrode g2 voltage (accelerator)	350	V
Electrode g1 voltage (electrode for picture cut-off) :		
- negative bias	150	V
- positive bias	0	V
Heater voltage	max.	6.9 V
	min.	5.7 V
Filament-cathode peak voltage :		
- filament negative with respect to cathode	125	V
- filament positive with respect to cathode	10	V
Target voltage	30	V
Dark current (image period : 40 ms)	5	nA
Peak target current (image period : 40 ms) (note 4)	300	nA
Faceplate :		
- exposure	250	lux.s
	or 25	fc. s
- temperature (storage and operating)	-10 to + 50	°C



Operationnal conditions

Scanned area : 9.5 mm x 12.7 mm
Faceplate temperature : 25 °C (note 5)

Electrode voltage modes :	Low	Intermediate	High	
Electrode g4 voltage	300	450	750	V
Electrode g3 voltage	180	300	500	V
Electrode g2 voltage	300	300	300	V
Electrode g1 voltage (note 6)	-45 to -100	-45 to -100	-45 to -100	V
Average "gamma" for target illumination :				
1 to 100 lux. (0.1 to 10 fc.) (note 7)	0.95	0.95	0.95	
Minimum blanking peak to peak voltage :				
- applied to g1 electrode	-75	-75	-75	V
- applied to cathode	+20	+20	+20	V
Limiting resolution at center of picture (note 8).	600	800	1 000	TV lines
Limiting resolution at corners	400	600	800	TV lines
M.T.F. response for 500 TV lines at center of picture (note 9)	20	40	50	%
Focus magnetic field	30 ± 2	40 ± 2	50 ± 2	Gauss
Deflecting coil peak current :				
- horizontal	130	170	200	mA
- vertical	15	20	24	mA
Alignment field	0 to 4	0 to 4	0 to 4	Gauss

Typical performance *

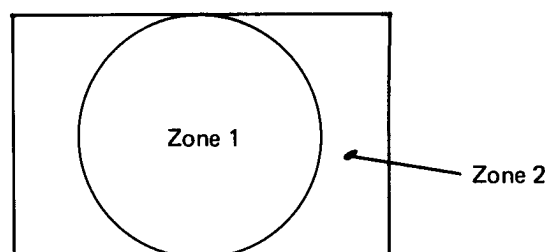
Faceplate temperature	25	°C
Readout time T _i (note 10)	1	s
Exposure time T _e	100	ms
Operating mode	recurrent	
Dark current	0.4 to 0.8	nA
Signal electrode voltage (note 11)	30	V
Exposure	1	lux.s.
	or 0.1	fc.s
Signal current	20	nA
Average gamma between 0.05 lux.s and 5 lux.s. (0.005 fc.s and 0.5 fc.s) . . .	0.9 to 1	

* IMPORTANT - These values correspond to a given operating mode. For particular application, please consult THOMSON - CSF.



SPURIOUS SIGNAL TEST

The test is performed using a uniformly diffused white test pattern that is separated into two zones as shown in drawing.



The tube is operated under "Typical Operation" with target voltage of 30 V and the lens adjusted to provide a signal current of 200 nanoamperes in standard TV (625 C.C.I.R.).

Spurious signals are classified by their size which is measured in percent of raster height.

Will actually be considered as defects, blemishes of contrast greater than 50 % (note 12).

Allowable spot size for each zone is shown in table :

*Ratio D / H (Percent raster height)	Number Allowed			
	Zone 1	Zone 1 + Zone 2		
		a	a + b	a + b + c
a : 0.8% < D/H ≤ 1%	0	1		
b : 0.6% < D/H ≤ 0.8%	1		3	
c : 0.2% < D/H ≤ 0.6%	3			6

0.2 % and under : do not count spots of this size unless concentration causes a smudge appearance

* D : average diameter of spot

H : raster height

Smudges, streaks, mottled or grainy background having a contrast ratio greater than 15% constitute a reject.



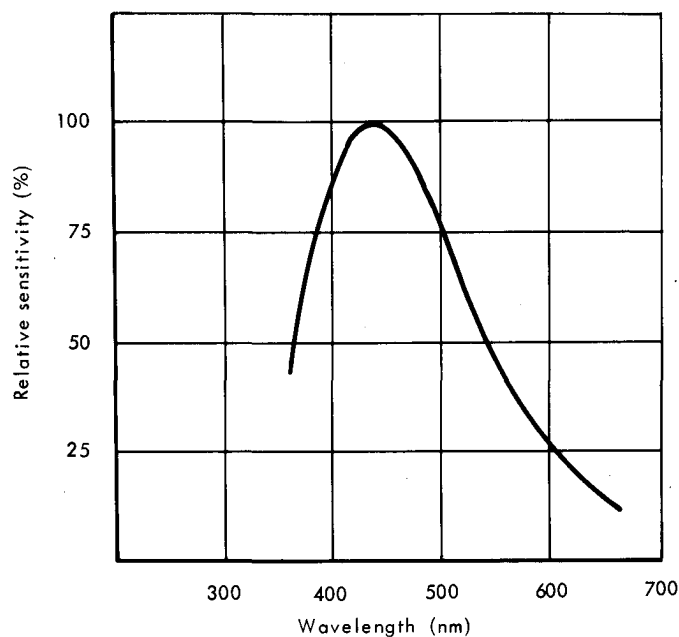
NOTES

- 1 - METOX - 86, rue de Villiers de l'isle Adam - PARIS 20ème - Téléphone : 636. 31-10.
- 2 - GERHARD KG - REICHELSEIM/ODW Germany.
CLEVELAND ELECTRONICS Inc. - 2000 Highland Road - TWINSBURG - OHIO 44 - 087.
- 3 - It is necessary to assure correct positioning of the tube inside the coils. An immediate test consists in observing the fine mesh grid, the wires of which should be inclined 45° with respect to scanning. Then again the front end of the deflecting yoke should be positioned at 20 mm from the tube faceplate.
- 4 - Target current is defined as total current in load resistance connected to target electrode : signal current plus dark current, dark current being the current left when illumination is subtracted.
Video amplifiers must be designed properly to handle peak target current of $0.3 \mu\text{A}$ to avoid amplifier overload and picture distortion.
- 5 - All these characteristics are provided for a temperature of faceplate of 25°C , the temperature range recommended is within 20 to 30°C . The rise of faceplate temperature is a function of ambient temperature, thermic dissipation of ambient devices and of the tube itself. Consequently, 10°C of faceplate temperature rise implies a dark current multiplied by a factor of 2.
- 6 - Without blanking pulses applied on electrode g1.
- 7 - Average "gamma" should be defined as the slope of the rectilinear part of transfer characteristics in log coordinates.
- 8 - Practically, limiting resolution corresponds to the resolution measured with twin bar test card with a modulation ratio of about 7 %.
- 9 - For 625 lines C.C.I.R. standard, line duration being $52 \mu\text{s}$ (line suppression period not included), 500 TV lines correspond to 6.25 MHz.
- 10 - For readout time between 1 and 100 s, dark current and signal current are approximately inversely proportional to this time.
- 11 - The signal electrode voltage is adjusted for maximum sensitivity. The corresponding value V_{sm} is the voltage that generally gives rise to white spots visible in darkness. It is advisable to operate with a voltage of 5 V below V_{sm} .
- 12 - Contrast is defined as : $100 \times \frac{\text{increment in video current due to blemish}}{\text{normal signal current}}$

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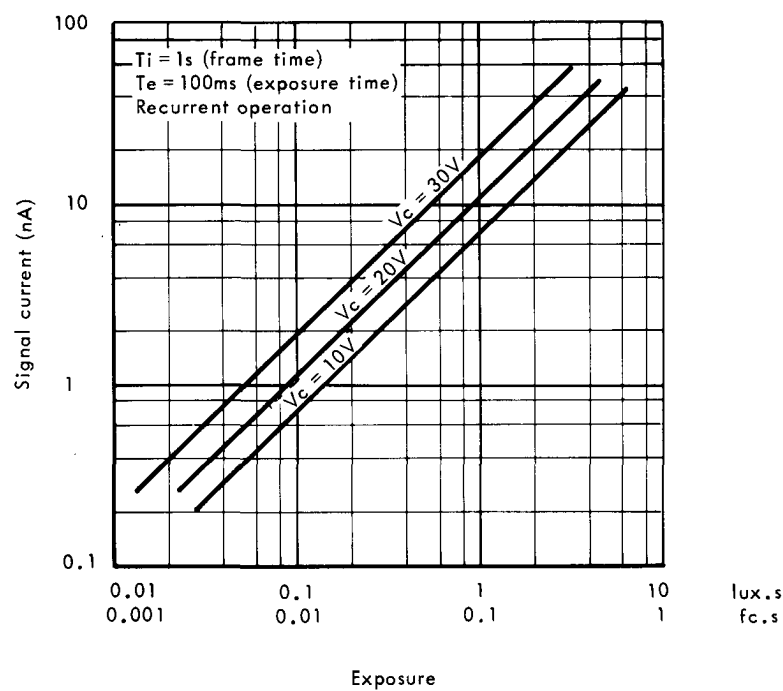
- Figure 1 -

SPECTRAL RESPONSE



- Figure 2 -

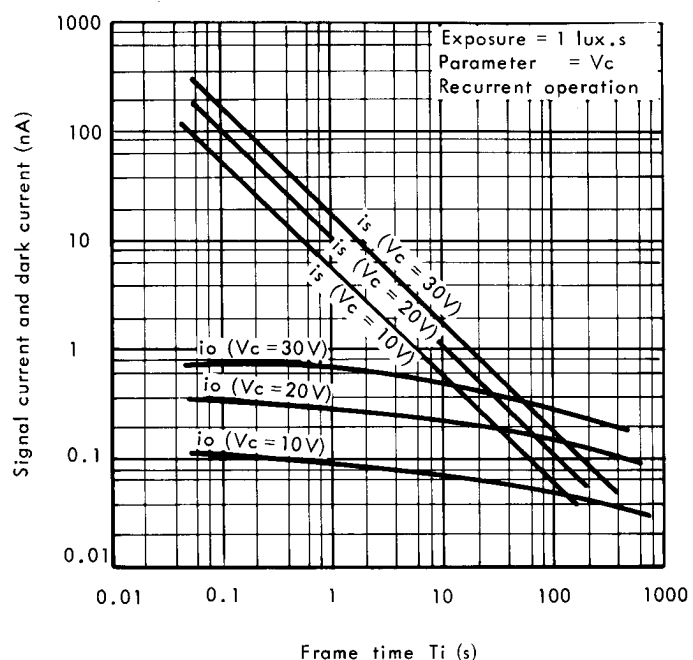
LIGHT TRANSFER CHARACTERISTICS





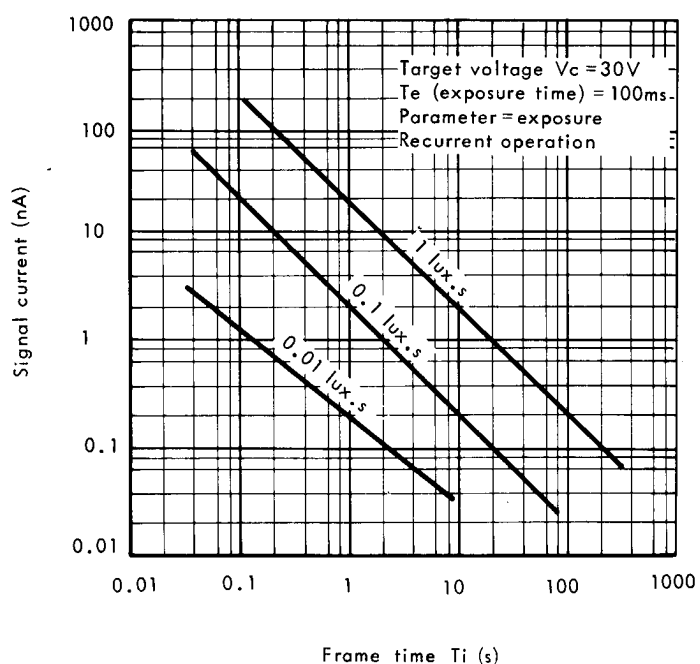
- Figure 3 -

CHARACTERISTICS OF SIGNAL CURRENT AND DARK CURRENT VERSUS FRAME TIME (T_i) FOR DIFFERENT VALUES OF SIGNAL ELECTRODE VOLTAGE (V_c)



- Figure 4 -

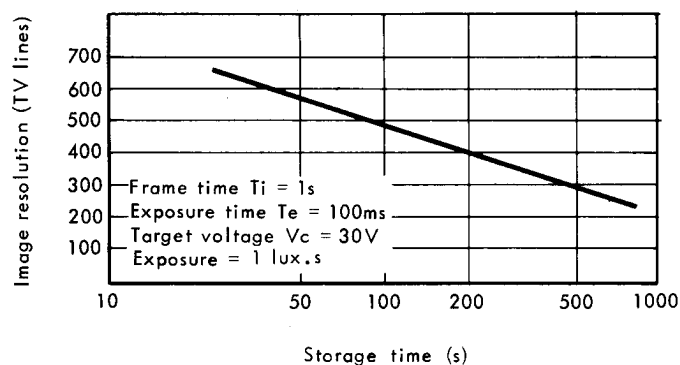
CHARACTERISTICS OF SIGNAL CURRENT VERSUS FRAME TIME (T_i) FOR DIFFERENT VALUES OF EXPOSURE





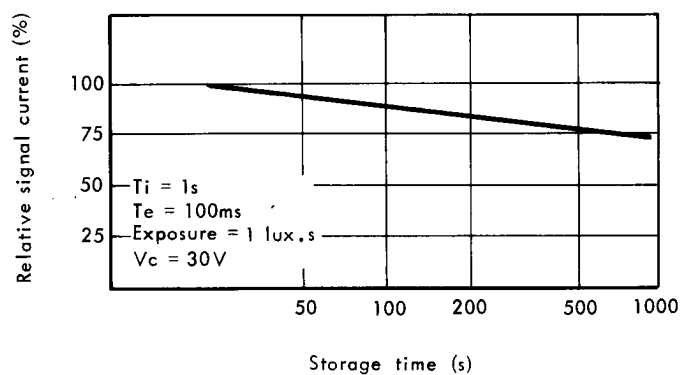
- Figure 5 -

RESOLUTION CHARACTERISTICS VERSUS STORAGE TIME



- Figure 6 -

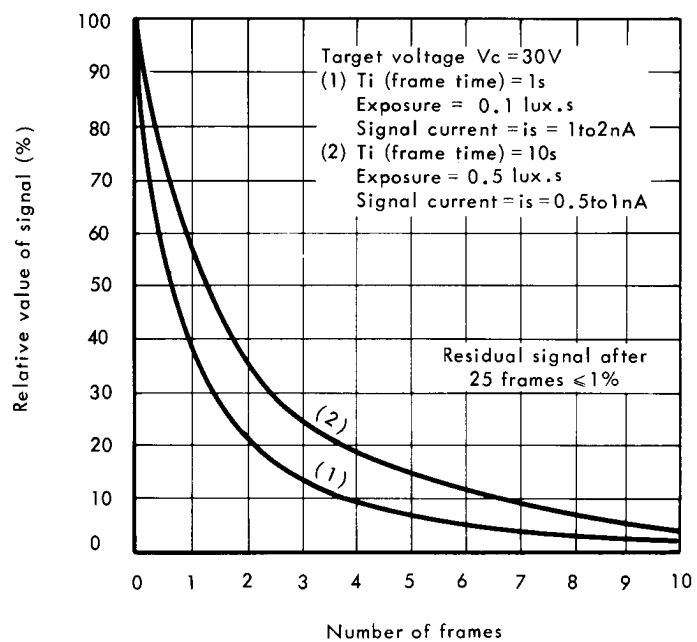
TYPICAL RELATIVE SIGNAL CURRENT VERSUS STORAGE TIME





- Figure 7 -

RESIDUAL SIGNAL IN PER CENT OF INITIAL SIGNAL CURRENT
VERSUS NUMBER OF SCANNING FRAMES

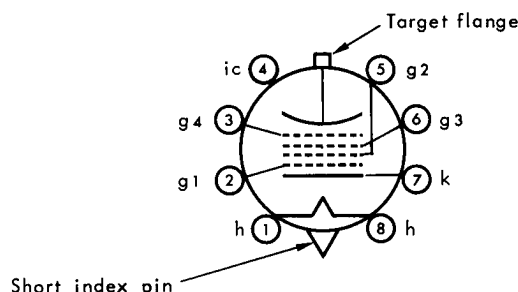
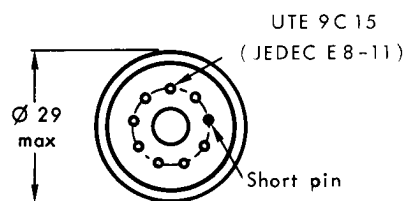




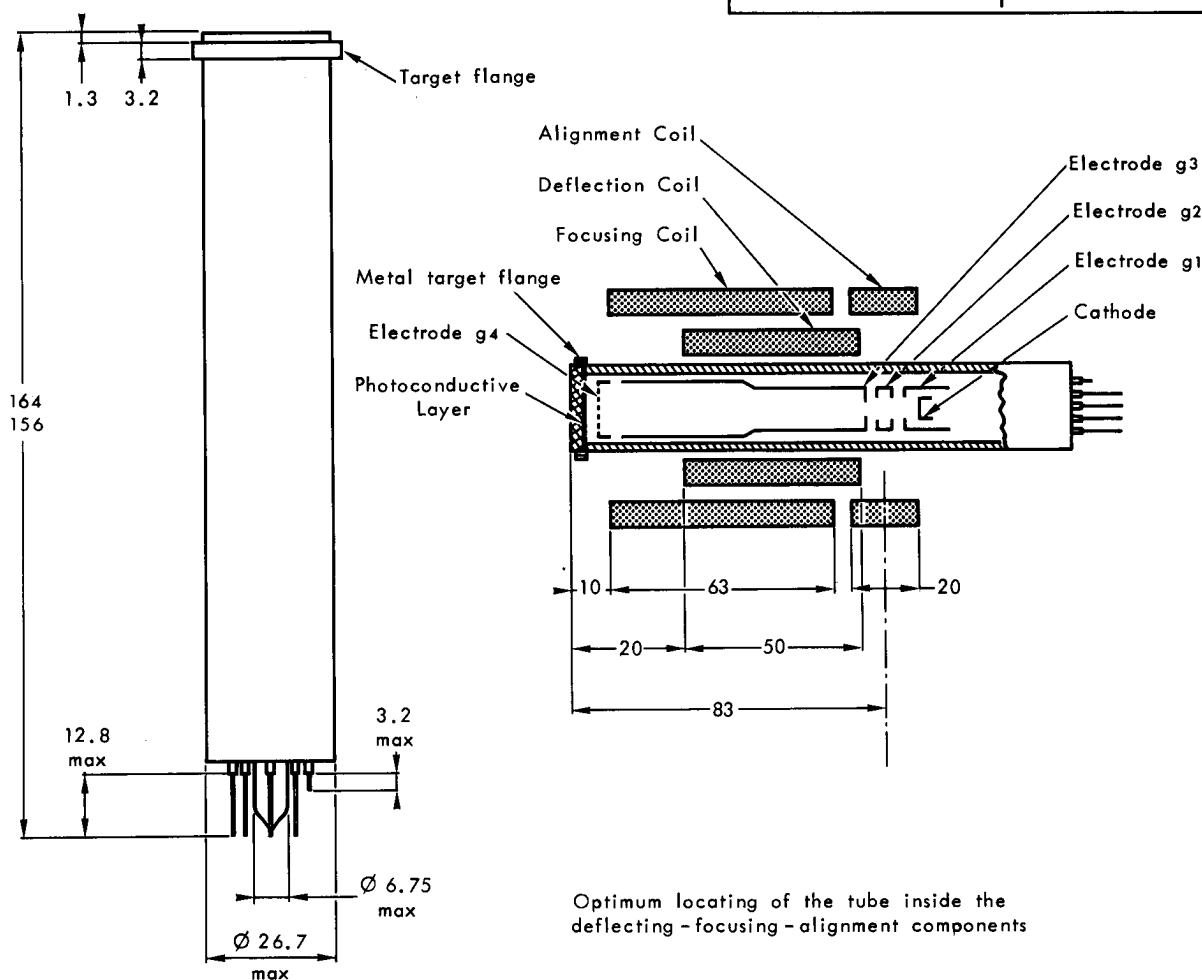
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OUTLINE DRAWING

BASING DIAGRAM



1 - Heater	5 - Electrode g2
2 - Electrode g1	6 - Electrode g3
3 - Electrode g4	7 - Cathode
4 - Internal connection	8 - Heater



Optimum locating of the tube inside the
deflecting - focusing - alignment components

Dimensions in mm.

