

SUPERSEDES DATA OF JULY 1985

## IMAGE INTENSIFIERS

The XX1500 series is a family of miniature, electrostatically self-focused, inverting microchannel plate image intensifiers. They have plane 18 mm input and output windows and an integral power supply with automatic gain control (AGC). Particular features include a S25 photocathode, external adjustment of gain, bright source protection (thanks to point highlight saturation) and low distortion.

This data must be read in conjunction with General Introduction Image Intensifiers.

The XX1500 family consists of:

XX1500	the basic version for use in direct viewing night vision systems.
XX1500HG	high gain version for photographic applications.
XX1500TV	as XX1500HG but with fitted photocathode mask and intended for use as a pre-amplifier for lens-coupled low light television camera systems.
XX1500TVMC	as XX1500TV but for fibre-optic camera tubes and solid state imaging devices.
XX1501	as XX1500 but with a concave fibre-optic screen allowing use of wafer tube eye-piece.
XX1502	fitted with a photocathode mask and a resistor network for external high voltage supply and primarily intended for fibre-optic coupled low light television applications.

## QUICK REFERENCE DATA

Input			
Photocathode		S25	
Useful diameter	min.	17,5	mm
Material		plane fibre optic	
Output			
Screen phosphor		P20, aluminized	
Useful diameter	min.	17,5	mm
Material		plane fibre optic	
Optical length	nom.	54,6	mm
Recommended supply voltage		2,6	V
Input current	max.	25	mA
Mass	max.	180	g

## CHARACTERISTICS

Measured at  $22 \pm 3$  °C with recommended supply voltage

	min.	typ.	max.
Sensitivity			
white light	280	350	$\mu\text{A/lm}$
$\lambda = 800$ nm	28	35	mA/W
$\lambda = 850$ nm	15	25	mA/W
Luminance gain, $\phi_G = 10$ mm, $E_i \approx 50$ $\mu\text{lx}$			
gain control at maximum	30 000	45 000	70 000
gain control at minimum	2 000		10 000
Mean screen luminance,			
$\phi_G = 10$ mm, $E_i \approx 20$ mlx	5,0		10,0 $\text{cd/m}^2$

# XX1500 SERIES

## CHARACTERISTICS (continued)

	min.	typ.	max.
Signal-to-noise ratio	3,0	3,8	
Resolution			
centre	32	36	lp/mm
edge, $\phi_E = 14$ mm	32	36	lp/mm
Magnification, any position	0,94		1.02
Distortion, $\phi_d = 1,44$ mm; $\phi_D =$ any		4	mm
Modulation transfer factors, values normalized to zero spatial frequency and referred to the screen			
2,5 cycles/mm	85	92	%
7,5 cycles/mm	65	67	%
16 cycles/mm	30	33	%
Veiling glare			2,0 %
Image alignment		0,8	mm
Recovery time		0,5	s
Brightness uniformity			3 : 1
Mounting position		any	

## RATINGS

Limiting values in accordance with the Absolute Maximum System IEC 134

	max.	min.
Supply voltage	3,4	
Photo cathode illuminance (see notes)	1,0	lx
Ambient temperature		
→ for storage	70	-54 °C
→ for operation, 2 hours max.	52	-54 °C
Axial forces between bearing surfaces	100	N

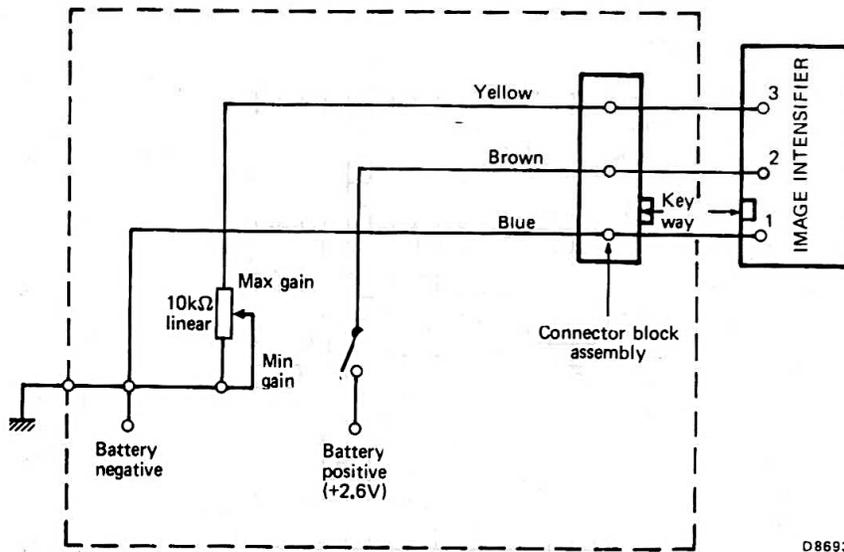
## Notes

If the supply voltage falls below 2,0 V, the intensifier may not function, but will not be damaged. If the supply voltage is reversed up to 60 s, the intensifier will not function, but will not be damaged.

Prolonged operations with illuminance exceeding 10 mlx can reduce the life of the intensifier. This corresponds to a scene illuminance of deep twilight when the intensifier is incorporated in a typical sight. However, operation of 2000 hours can be expected with a photocathode illuminance of 1 mlx.

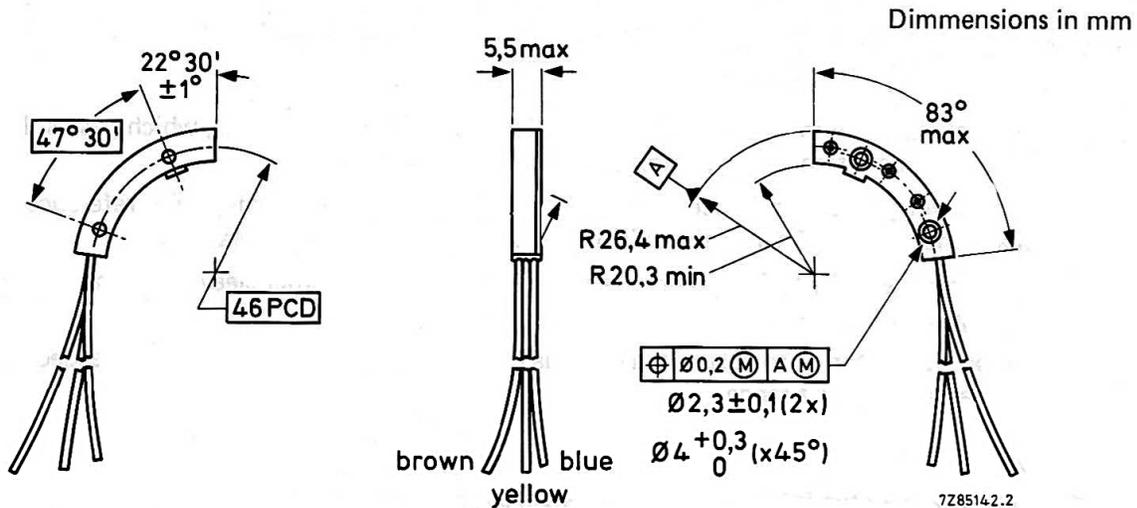
## Connection diagram

Each intensifier in this series is supplied with a connector (see next page). XX1500 can be supplied with a PTFE annulus around the edge of the cathode window.



D8693

Fig. 1 Equipment wiring diagram.



7Z85142.2

Fig. 2 Connector block assembly.

blue: earth/battery negative

brown: battery positive

yellow: customer gain control; 10 kΩ linear variable resistor to battery negative  
( $R_s = 10\text{ k}\Omega$  yields min. gain,  $R_s = 0$  yields max. gain).

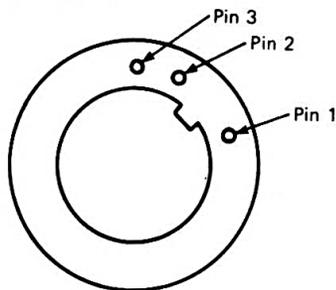


Fig. 3 Connections at photocathode end of intensifier.

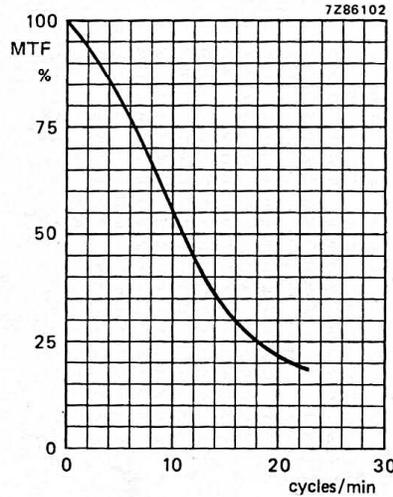


Fig. 4 Typical modulation transfer factor.

**MECHANICAL DATA**, see Fig. 5.

The mechanical axis is defined as the axis perpendicular to the pads plane 'A', which passes through the centre of the cathode reference ring diameter 'B' M.M.C.

The intensifier will fit into a cylinder of 53,00 diameter or greater, concentric with reference 'B' M.M.C. and sit on a plane perpendicular to the axis of that cylinder at room temperature.

Linear expansion coefficient of reference diameter 'B' and the intensifier sleeve (dimension  $56 \pm 1$ ) is less than or equal to  $100 \times 10^{-6} / K$ .

The onus is on the customer to ensure that the maximum mounting forces are not exceeded throughout the operational temperature range.

**WARNING**

Immediately after operation, the screen will remain electrostatically charged for approximately 1 minute, during which time the intensifier should not be handled. Any attempt to discharge the intensifier by any means may result in irreparable damage.

**ENVIRONMENTAL TESTS**

- Shock      6 shocks, half-sinewave, in two directions, parallel and perpendicular to the intensifier axis, with peak acceleration  $1400 \text{ m/s}^2$ , duration 9,0 ms.
- Vibration   Sinewave, in two directions, parallel and perpendicular to the intensifier axis, with peak acceleration  $25 \text{ m/s}^2$ , over frequency range 10 to 3500 Hz.

Outline drawing

Dimensions in mm

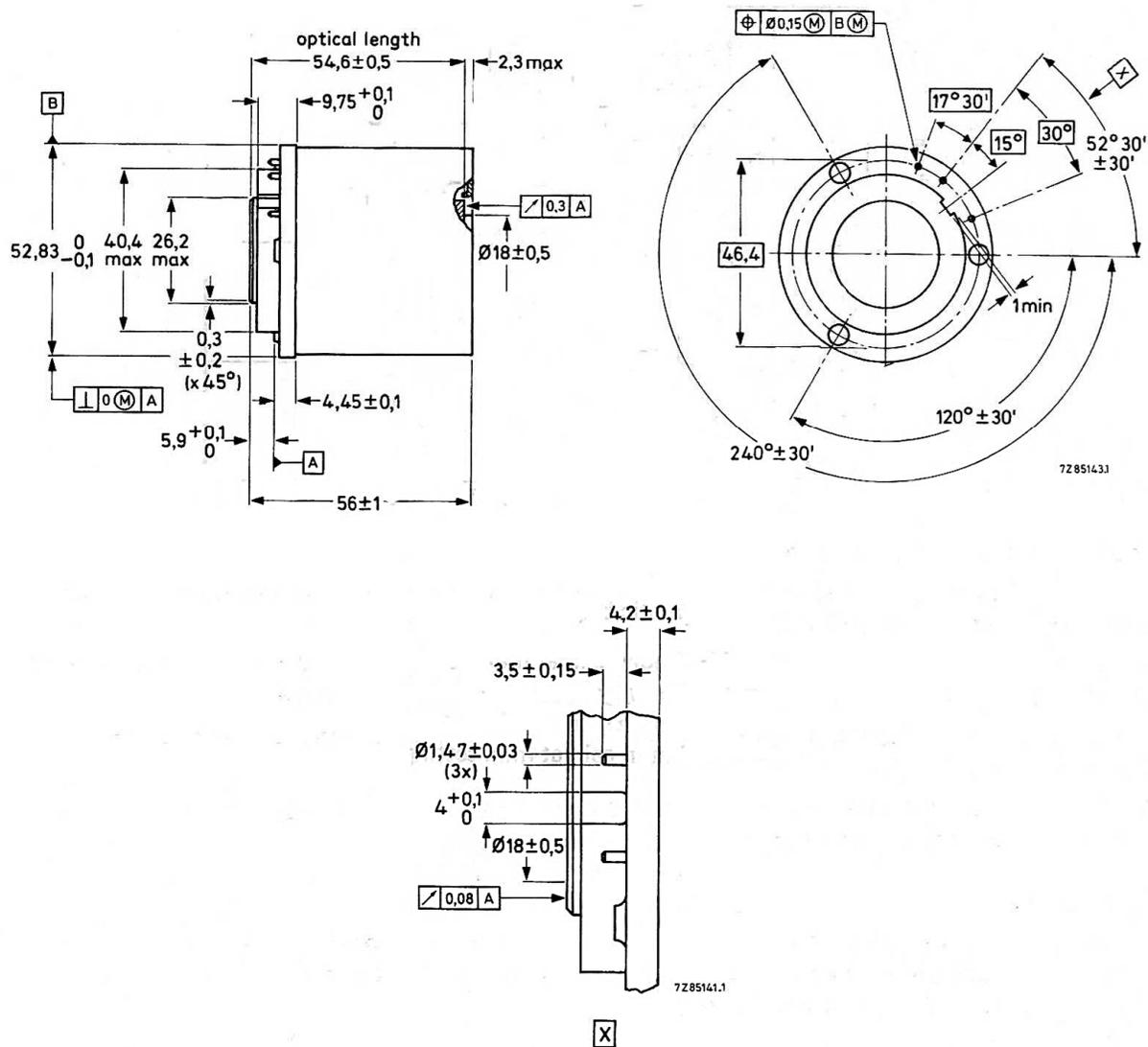


Fig. 5 Outlines of types XX1500, XX1500HG, XX1500TV, XX1500TVMC.  
For XX1501 and XX1502 see also separate data sheet.

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