



" SD Series I.I."

Toshiba X-ray Image Intensifier
E5870SD-P1

Input Field : 15cm/10cm (6"/4")

Output Image Diameter : 20mm

FEATURING:

- **High resolution** : **66 Lp/cm**
- **High conversion factor** : **21 $\frac{\text{cd/m}^2}{\mu\text{Gy/s}}$**

"SD Series I.I." E5870SD-P1 has been perfected by the integration of several aspects of advanced technology.

The input window is of a thin metal plate, which has good X-ray transparency characteristics and reduces X-ray scatter.

It uses a thick input phosphor screen made with an extremely fine pillar shaped structure. This has high X-ray absorption and very high conversion efficiency.

In addition, there is a thin output phosphor screen on a single thick-glass output window with an anti-reflective coating, offering very high contrast for small details, very low structure noise and high MTF characteristics.

The E5870SD-P1, employing these manufacturing techniques, provides outstanding performance in resolution, brightness, contrast and noise.

The E5870SD-P1 is supplied in a housing which provides mu-metal magnetic shielding. The housing is lined with radiation shielding designed to comply with FDA Radiation Performance Standards, 21 CFR subchapter J.

★The information contained herein is presented only as a guide for the application of our products.

No responsibility is assumed by TOSHIBA ELECTRON TUBES & DEVICES CO., LTD. (TETD) for any infringements of patents or other rights of the third parties which may result from its use.

No license is granted by implication or otherwise under any patent or patent rights of TETD or others.

★The information contained herein may be changed without prior notice. It is therefore, advisable to contact TETD before proceeding with the design of equipment incorporating this product.

GENERAL DATA

MECHANICAL:

Overall Length	267.5±5 mm
Maximum Diameter.....	95±3 mm
Nominal Entrance Field Size (Note 1)	150 mm min.
Output Image Diameter	20±0.5 mm
Weight (approx.)	5 kg
Dimensional Outlines.....	Refer to pages 17 & 18

ELECTRICAL:

	N mode	M mode	
Anode Voltage	30	30	kV
G3 Electrode Voltage	2 to 5	7 to 9	kV
G2 Electrode Voltage	400 to 600	400 to 700	V
G1 Electrode Voltage	50 to 200	50 to 200	V
Ion Pump Voltage	1.3 to 3.2	3.9 to 9.0	kV
Photocathode Voltage	0	0	V

POWER SUPPLY

High Voltage Power Supply

Input voltage.....	24±1 Vdc
Output Voltage	Refer to page 9

ENVIRONMENTAL:

	Under delivery and stock	Under operating
Temperature	-15 ~ 45 °C	5 ~ 40 °C
Humidity	10 ~ 90 %	30 ~ 85 %
Pressure	50 ~ 106 kPa	70 ~ 106 kPa

ABSOLUTE MAXIMUM RATINGS

Anode Voltage	32 kV
G3 Electrode Voltage.....	10 kV
Potential Difference between Anode and G3 Electrode	24 kV
Potential Difference between G3 Electrode and G2 Electrode	10 kV
G2 Electrode Voltage.....	1400 V
G1 Electrode Voltage.....	400 V
Photocathode Current	
Continuous	0.1 μ A
Pulsed	2 μ A
Input X-ray dose	8.73×10^{-3} Gy/min [1R/min]

PERFORMANCE DATA

	N mode	M mode		
Central Resolution (Note 3)	66	77	Lp/cm	typ.
Conversion Factor (Gx) (Note 4)	21	-	$\frac{\text{cd/m}^2}{\mu\text{Gy/s}}$	typ.
	180	-	$\frac{\text{cd/m}^2}{\text{mR/s}}$	typ.
Contrast Ratio (Note 5)				
10 % area contrast	30:1			typ.
10 mm dia. contrast	20:1			typ.
DQE (IEC standard)(Note 6)	42		%	typ.

NOTES

1. Nominal entrance field size is defined as the diameter of the input screen to the corresponding output image when the distance between X-ray source and I.I. is infinite.
2. When DC 24 V is applied to the high voltage power supply, the optimum operating-voltage are supplied to the electrodes of the I.I..
Therefore the focusing voltage need not be adjusted. Be careful not to touch the variable resistor for focusing voltage.
3. Resolution is observed of the output image by a microscope which magnification is 30x or more. A type 6 funk's X-ray chart is attached to the image intensifier entrance plane.

4. Conversion factor, the quotient of output brightness [cd/m^2] to the input dose rate [$\mu\text{Gy/s}$ or mR/s], is measured by the IEC method. The X-ray quality is specified as 7 mm AL H.V.L. with a 22 mm AL filter.
5. Contrast ratio is defined as the ratio of the brightness in the center of output image when total entrance field is irradiated to the brightness in the center of output image when the concentric circular lead disk is placed at the center of the entrance plane.
 "10% area contrast" is measured by using the lead disk which is 10% area of entrance field area.
 "10 mm dia. contrast" is measured by using the lead disk which is 10 mm diameter.

6. DQE (Detective Quantum Efficiency) is defined as follows,

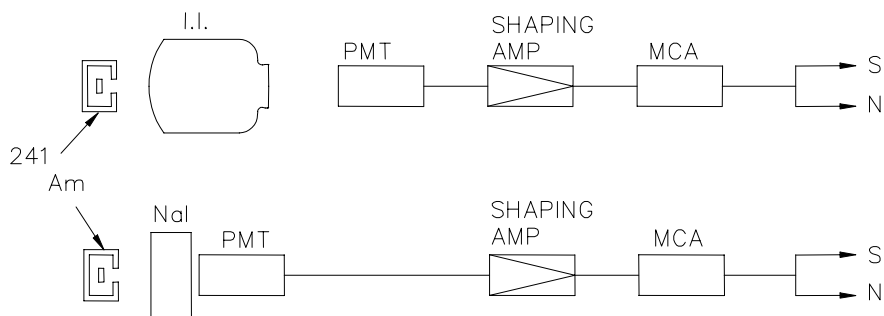
$$\text{DQE} = \frac{[(S/N)_{\text{OUT}}]^2}{[(S/N)_{\text{IN}}]^2}$$

The DQE of IEC standard (IEC 61262-5) is determined by the pulse-height spectrum method. The source of input radiation is the radio nuclide ^{241}Am , which emits gamma-ray photons having a monochromatic energy of 59.5 keV.

The $(S/N)_{\text{OUT}}$ of the I.I. is determined to analyze the pulse-height spectrum resulting from the photo multiplier tube (PMT) detection of light photons emitted by incident gamma-ray quanta. The signal element (S) and noise element (N) are determined respectively by the average of pulse-height spectrum and the standard deviation of it.

The signal-noise ratio is a square root of the number of the number of all incident quanta. If a monochromatic energy spectrum is measured by an ideal detector such as NaI (TI) crystal.

Therefore, the $(S/N)_{\text{IN}}$ is determined to count all incident quanta using NaI crystal.



The information about EMC conformity (IEC60601-1-2 Ed2, 2001)


Guidance and manufacturer's declaration-electromagnetic emissions		
The X-ray image intensifier is intended for use in the electromagnetic specified below. The customer or the user of the X-ray image intensifier should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group1	The X-ray image intensifier users RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Group A	
Harmonic emissions IEC61000-3-2	Not applicable	
Voltage fluctuations/ flicker emissions	Not applicable	
IEC61000-3-3		

The limited length of cables for conforming EMC (IEC60601-1-2 Ed2, 2001)

Cables	Cable length (Max.)
DC power input cable	0.74m

Refer to 9 pages about wiring and connection of these cables.

Guidance and manufacturer's declaration – electromagnetic immunity			
The X-ray image intensifier is intended for use in the electromagnetic specified below. The customer or the user of the X-ray image intensifier should assure that it is used in such an environment.			
Immunity test	IEC60601 Test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC61000-4-2	±6kV contact ±2/4 kV contact ±8kV air ±2/4 kV air	±6kV contact ±2/4 kV contact ±8kV air ±2/4 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material. The relative humidity should be at least 30 %.
Electrical fast transient / burst IEC61000-4-4	±2 kV for power supply lines ±1kV for input/output lines	±2 kV for power supply lines ±1kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC61000-4-5	±1 kV differential mode ±0.5kV differential mode ±2kV common mode	±1kV differential mode ±0.5kV differential mode ±2kV common mode	Mains power quality should be that of a typical hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC61000-4-11	< 5% UT (> 95%dip in, U _T) for 5 sec	< 5% UT (> 95%dip in, U _T) for 5 sec	Mains power quality should be that of a typical hospital environment. If the user of the X-ray image intensifier requires continued operation during power mains interruptions, it is recommended that the X-ray image intensifier be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field IEC61000-4-8	3A/m	3A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in atypical commercial or hospital environment.
Note: (1) U _T is the a .c.mains voltage prior to application of the test level. (2) This angiography X-ray system can only allow to use the designated cables and components. If the different cables or components are used, they may deteriorate the performance of recommended separation distance between portable and mobile RF communications equipment and this system.			

Guidance and manufacturer's declaration - electromagnetic immunity			
The X-ray image intensifier is intended for use in the electromagnetic environment specified below. The customer or the user of the X-ray image intensifier should assure that it is used such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Conducted RF IEC61000-4-6	3 Vrms 150 KHZ to 80 MHz	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the X-ray image intensifier, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1,2\sqrt{P}$ 150kHz to 80MHz $d = 1,2\sqrt{P}$ 80 MHz to 800 MHz $d = 2,3\sqrt{P}$ 800 MHz to 2.5 GHz
Radiated RF IEC61000-4-3	3 V/m 80 MHz to 2,5GHz	3 V/m	Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey ^a , should be less than the compliance level in each frequency range ^b . Interference may occur in the vicinity of equipment marked with the following symbol: 
NOTE: (1) At 80 MHz and 800 MHz, the higher frequency range applies. (2) These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, object and people. (3) This angiography X-ray system can only allow to use the designated cables and components. If the different cables or components are used, they may deteriorate the performance of electromagnetic immunity.			
^a Field strengths from fixed transmitters, such as base stations for radio(cellular/cordless) telephones and land mobile radios. Amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the X-ray image intensifier is used exceeds the applicable RF compliance level above, the X-ray image intensifier should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the X-ray image intensifier.			
^b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3V/m.			

Recommended separation distances between portable and mobile RF communications equipment and The X-ray image intensifier			
The X-ray image intensifier is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of The X-ray image intensifier can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communication equipment (transmitters) and The X-ray image intensifier as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz $d = 1,2\sqrt{P}$	80 MHz to 800 MHz $d = 1,2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2,3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23
For transmitters rated at a maximum output power listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter. Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.			
NOTE: (1) At 80 MHz and 800MHz,the separation distance for the higher frequency range applies. (2) These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption by absorption and reflection from structures objects and people. (3) The X-ray image intensifier can only allow to use the designated cables and components. If the different cables or components are used, they may deteriorate the performance of recommended separation distance between portable and mobile RF communications equipment and this system.			

CAUTION

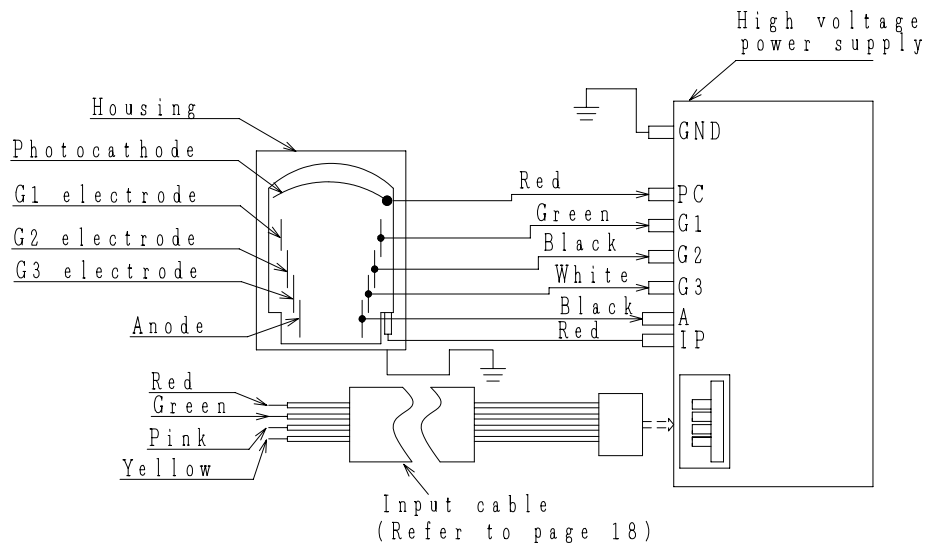


CAUTION

DO NOT USE THE ELECTROMAGNETIC DEVICE, SUCH AS (CELLULAR/CORDLESS) TELEPHONES AND RADIO CONTROLLED TOYS, CLOSE TO THIS SYSTEM. OTHERWISE, IT MAY CAUSE MALFUNCTION OF THE SYSTEM.

ELECTRICAL WIRING AND CONNECTING

X-ray image intensifier is operated with 24 Vdc applied to the built-in high voltage power supply.



Wiring and connecting are shown as follows.

Power supply has been wired for 24 ± 1 Vdc usage and the following color code shall apply :

Red : Connect to 24 Vdc line

Green : Connect to 24 Vdc return line (0 Vdc) and must be connected to earth ground.

Dual-mode operation select

N (6" mode) Yellow and Pink Open

M (4" mode) Yellow shorted to Pink

Output voltage of high voltage power supply.

	Symbol	N mode	M mode
Anode Voltage	A	30kV*	
G3 Electrode Voltage	G3	2.0 to 5.0kV*	7.0 to 9.0kV*
G2 Electrode Voltage	G2	400 to 600V*	400 to 700V*
G1 Electrode Voltage	G1	50 to 200*	50 to 200V*
Ion Pump Voltage	IP	1.3 to 3.2 kV*	3.9 to 9.0 kV *
Photocathode Voltage	PC	0V	

* These voltages have been already adjusted to the optimum operating voltages.

SAFETY PRECAUTIONS

X-RAY LEAKAGE:

Incorporate TETD I.I. in TETD housing or the equivalent.

TETD housings are provided with X-ray shielding. X-ray shielding, especially its leads plate, should not be deformed or bruised.

If using other optical unit and TV camera instead TETD, suitable protection of 66 mm diameter for X-ray shielding, (at least 0.5mm thickness of lead equivalent) should be provided on them.

The X-ray irradiating area for the input face of the housing should be limited within a 150 mm diameter circle in order to prevent X-ray leakage through the gap at the circumference of the input face of housing.

KEEP THE FOLLOWING ITEMS:

- (1) The minimum distance between the focal spot of X-ray tube
and the entrance plane.....73 cm min.
- (2) Maximum fluoroscopic X-ray tube voltage 80 kVp
- (3) The whole weight of the accessories (optical distributor,
TV camera, etc.) attached to the housing 7 kg max.

SAFETY PRECAUTIONS AND WARNING



Find this document before using X-ray image intensifier and X-ray imaging system

This document describes the attention of equipment manufactures and users to use safety TOSHIBA X-ray image intensifier (I.I.). Please find the technical data sheet of each product and this document "SAFETY PRECAUTIONS AND WARNING" and understand these contents before using I.I.. The I.I. is supplied with high voltage and used under X-ray irradiation. Therefore engineers or service people who have sufficient technical knowledge and experience shall handle the I.I. with enough care.

Moreover these documents are always stored and can be seen in operating place. If you have any questions, please contact TOSHIBA ELECTRON TUBES & DEVICES CO., LTD (TETD) subsidiaries or engineering department.

The I.I. present a certain number of potential risks by the very nature of the physical principles included in their manufacture or operation and because of the materials used to make I.I.. Therefore equipment manufactures and users shall take on themselves the responsibility because of protecting against these risk and respecting local safety laws and regulations.



1. Electric Shock

X-ray image intensifiers (I.I.) operate under very high voltages (around 30kV). These high voltages necessary for I.I. operation can be deadly.

In operating, do not touch the lead wires and connectors in the cover boxes of the I.I. and TV camera, because the high voltage is supplied with them. If touching lead wires and connectors, please turn off the power supply and discharge the remained electric charge before connecting, disconnecting and handling them. The housing of the I.I. should always be connected to ground. All ground terminals and ground wires shall be also done to ground.



2. Ground Connection

Connect all ground terminals and cables of the X-ray image intensifier, TV camera and TV monitor to ground. The housing with ground terminal should be connected to ground. The resistance between ground terminal and ground cables shall be less than 0.1 ohms. The sectional area of the conductor is required for 0.75 square meters or more.

3. Glass Implosion

The X-ray image intensifiers (I.I.) are a high-vacuumed electron tube containing glass. Do not scratch or strain the glass of the I.I. for the prevention of the implosion.

- (1) Because of the risk of implosion, a protection mask shall be put on and extreme care shall be taken when manipulating the bare tube.
- (2) The aluminum plate (for light-shielding) on the entrance plane of housing also plays as a protection against the injury due to implosion. When removing the plate, the input side shall not face a person. The protection plate such as anti-scattering grid is recommended when removing the plate.
- (3) The distance between the surface of output window and lens attaching plate shall be confirmed due to the data sheet or the specification when the object lens is mounted for the prevention of damage on output window.

4. Manufacturing of Housing

Do not manufacture the housing because of the weakness of housing strength and the cause of implosion and damage.

5. Weight of Mounted Equipment on Housing and Position of the Center of Gravity

The total weight of mounted equipment on housing should be restricted according to the technical data sheet or the specification. Moreover, the position of the center of gravity of mounted equipment shall be less than 30cm apart from output plane and less than 10cm apart from the central axis.

6. Screw for Housing

As the screws of the housing are tightened by proper torque, do not loosen or remove them except the necessity on installation (Covers of power supply box, terminal box and camera).

7. Fixing of Housing to Equipment

Fix the housing to the equipment for the prevention of the dropping according to the technical data sheet or the specification.

8. Shipping and Handling

Keep the axis of the X-ray image intensifier (I.I.) horizontal when I.I. is shipped, handled and mounted to equipment.

9. X-ray Leakage

- (1) TOSHIBA X-ray image intensifier (I.I.) shall have incorporated lead shielding housing.
- (2) TETD housing provides efficient protection against X-ray radiation in compliance with DHHS 21 CFR 1020-30 and 1020-32 and Japanese medical regulations. As the output window does not completely shield the X-rays, additional X-ray protection should be provided on equipment that is attached to the output flange, or when viewing directly shut output image (for example, with a lead containing glass).
- (3) The X-ray radiation area should be limited within the following area as shown in the table.

Type	Input diameter (mm)	Radiation area (mm)	Type	Input diameter (mm)	Radiation area (mm)
4	100 (4")	100	12	310 (12")	310
6	150 (6")	150	14	356 (14")	356
7	170 (7")	170	16	410 (16")	410
9	230 (9")	230			

10. Label

Do not remove all labels on X-ray image intensifier.

11. Stop Operation

A limited operating life and the possibility of random failures are inherent to X-ray image intensifier (I.I.) and shall be taken into account for the protection of personnel and equipment. The operation of I.I. under inappropriate conditions, either due to the lack of care or knowledge, can lead to grave risk to the life and limb of personnel, independent of the risk of I.I. and/or equipment damage.

12. Scrap

The housing of X-ray image intensifier (I.I.) has lead plate for the prevention of the X-ray leakage. As the lead powder or vapor is harmful for human health, it should be disposed as following to the local regulation or returned back to us with your cost of transportation. We dispose it in our facility with free of charge.

13. Input Window

The input window consists of a very thin aluminum material and is sometimes at around 200VDC potential (In this case, the description for caution is printed on the input window). This window is very fragile and shall never be touched and face the patients and objects directly.

 **14. Power Supply**

- (1) The power supply attached to each X-ray image intensifier (I.I.) adjust the specified voltage to each electrode to suit the best resolutions and entrance field size at the factory. Therefore it is not necessary to touch the potentiometers in I.I..
- (2) Please contact TETD subsidiaries and engineering department when other power supply is used.
- (3) Do not solder the power supply connections directly to the corresponding pins.

 **15. High Voltage Terminal Cable**

The spring in high voltage terminal cable shall contact with the protective resistance.

 **16. Magnetic Shield**

X-ray image intensifier (I.I.) is under the influence of the magnetic field. The I.I. has sometimes image distortion, poor resolutions due to the magnetic field. The side of TETD housing has a magnetic shield for decreasing the influence of magnetic field to I.I.. However, the entrance plane is not shielded. Therefore, keep away any magnet and/or magnetic material from I.I..

Magnetic shield material shall not be manufactured and shocked due to cutting, drilling and changing the shape since the magnetic shield ability is decreasing.

 **17. Demagnetization**

X-ray image intensifier (I.I.) uses the iron-type materials, therefore, it is probable for I.I. to magnetizes due to additional magnetic field. The magnetized screwdriver should not use. It is necessary to demagnetize due to alternative magnetic field. The focal voltage to electrode may alternate when the demagnetization is fulfilled.

 **18. Optical Distance**

Do not loose and/or remove screws for fixing the output flange since this flange has adjusted for attached optical equipment.

 **19. Adjustment of Resolution**

It is not necessary to adjust the voltage of attached power supply at each X-ray image intensifier since adjustment has been fulfilled at the factory. When re-adjustment is required, the microscope with large magnification (10 times to 40 times) should be used.

⚠ 20. Environmental Temperature, Humidity and Atmosphere

The specified temperature and humidity in operating and storage describe at the technical data sheet and the specification. Moreover, X-ray image intensifier (I.I.) shall not experience large and fast temperature and humidity change. The bright sunshine should also avoid.

Do not apply voltages of power supply when I.I. is not set and stored in complete darkness. Do not use and set the I.I. in an atmosphere of inflammable and/or corrosion gasses.

⚠ 21. Shipment

All attached equipment (optical lens, distributor, TV camera and others) should remove at shipment. After that, X-ray image intensifier (I.I.) should hold in polyethylene-type bag and pack in TETD packing box or early equivalent one to protect. Keep the axis of the I.I. horizontal at shipment.

⚠ 22. Mechanical Shock and Vibration

The housing has a shock-absorbing mechanism, however, be careful not to give a mechanical shock or vibration to the housing. Take into account for the precaution in the technical data sheet and/or the specification when X-ray image intensifier is used in car, bus and/or truck.

⚠ 23. Ingress of Liquid

Do not splash the X-ray image intensifier with any liquid. Occasionally that is a cause of damage.

⚠ 24. Burning in

The conversion factor of X-ray image intensifier is decreasing under use. It depends on the accumulated exposure to X-ray image intensifier. Therefore when the fixed pattern is used for a long time, the boundary can be observed, because the brightness difference between the X-ray opaque area and X-ray transparent area is occurred and the burning in the output plane is observed under this condition. If this burning happens at once, it cannot recover. Therefore we strongly recommend taking care of defending against this burning in.

Moreover, do not apply X-ray if an ion spot appears. It is probable that the fixed pattern appears.

⚠ 25. Other Cautions

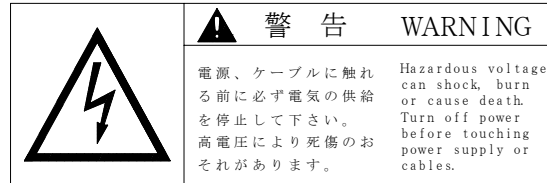
- (1) Maximum fluoroscopic X-ray tube voltage 80 kV
- (2) Maximum Input dose rate 8.73×10^{-3} Gy/min [1R/min]
- (3) The minimum distance between the focal spot of X-ray tube
and the entrance plane 73 cm

CAUTION LABEL

(a) This label is a warning label to notify the user of the following point.

"This parts are quite dangerous for high voltage"

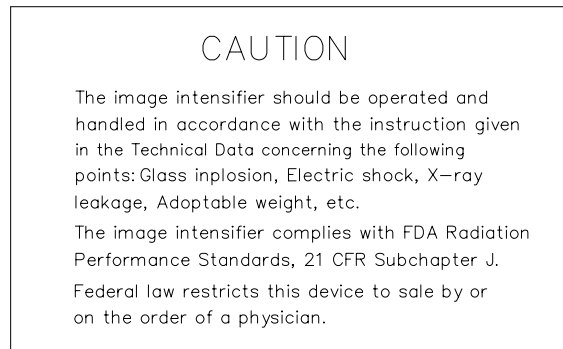
Attachment position: power supply



(b) This label is a caution label to notify the user of the following point.

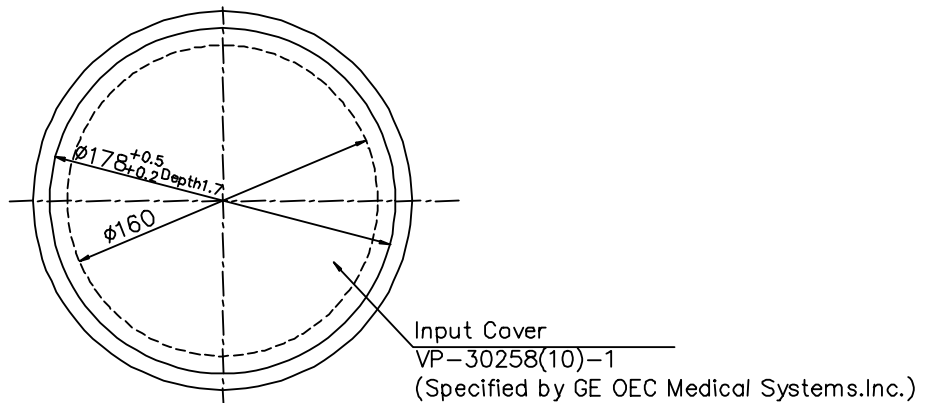
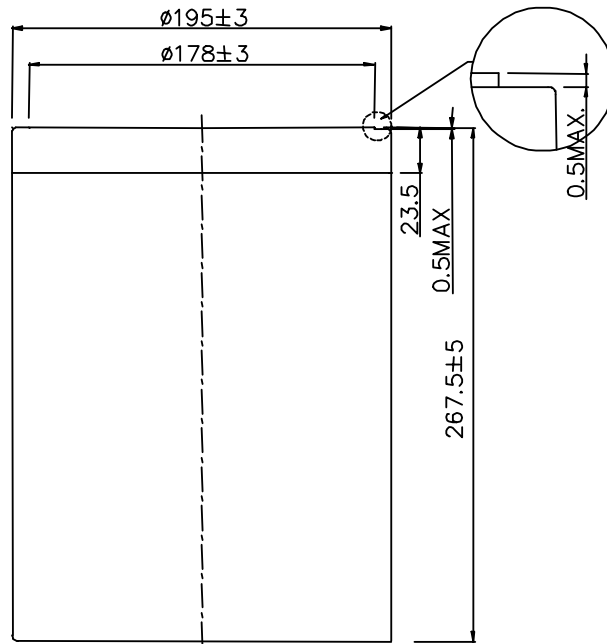
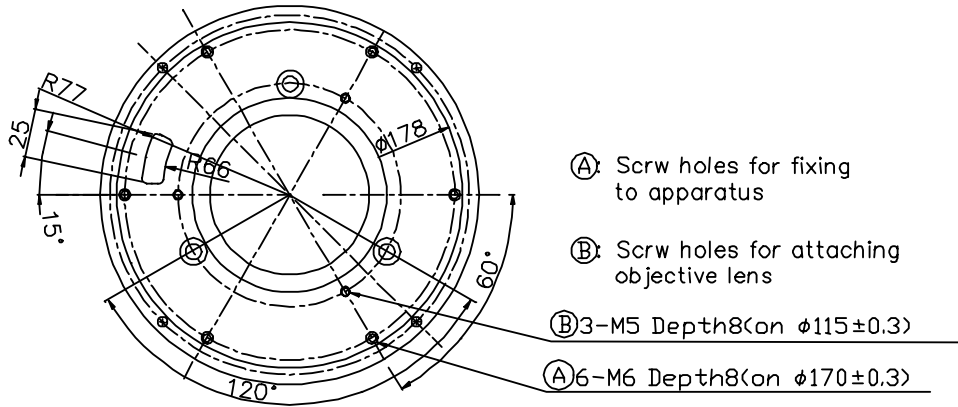
"This contents are quite important for safety"

Attachment position: Housing



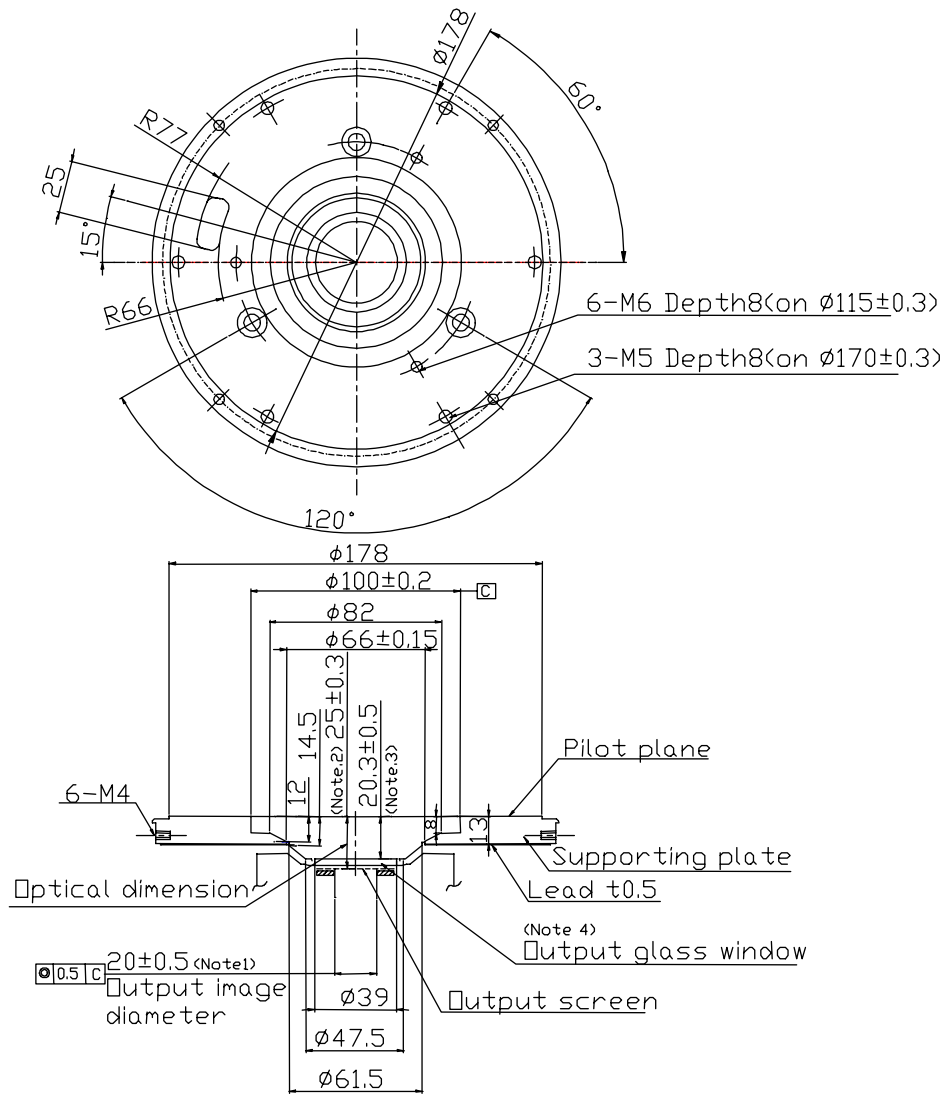
DIMENSIONAL OUTLINE (1)

Unit : mm



DIMENSIONAL OUTLINE (2)

Unit : mm



OUTLINE NOTES :

1. The center of the supporting plate will fall within a 0.5 mm Max radius circle concentric with the output image center.
2. The distance between the output screen and the pilot plane (optical dimension) should be 25±0.3mm and off parallel 5' max.
3. The distance between the output glass window surface and the pilot plane should be 20.3±0.5mm.
4. Phosphor deposited output window glass

Glass thickness	t = 7.0±0.2mm
Refractive index	n _D = 1.49±0.02

HIGH VOLTAGE POWER SUPPLY

ELECTRICAL:

Input

Input voltage.....	24±1 Vdc
Continuous current.....	0.4 A max.
Starting current at switch on.....	1.0 A max.

Output

A (Anode Voltage)

Output voltage	30 kVdc
Output current.....	30 µA max.
Ripple	0.3 % max.
Load Regulation	0.5% max. / change from 10000 megohms load to 1000 megohms load
Input voltage regulation	0.3% max./input change of 24V±1V with load constant
Drift.....	0.5% max. / 8 hours (5 minutes warming up)

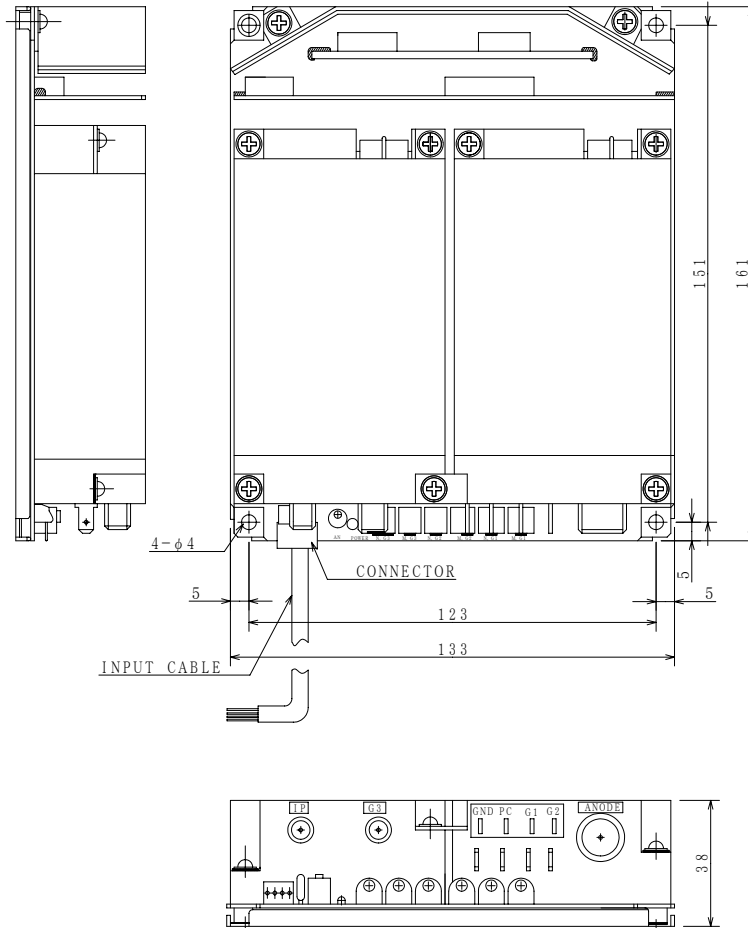
G3 (G3 Electrode Voltage)

Output voltage

N	2.3 kVdc to 4.0 kVdc
M.....	8.5 kVdc to 11.5 kVdc
Output current.....	12 µA max.
Ripple.....	0.3 % max.
Load Regulation.....	0.5% max. / change from 10000 megohms load to 1000 megohms load
Input voltage regulation.....	0.3% max./input change of 24V±1V with load constant
Drift	0.5% max. / 8 hours (5 minutes warming up)

DIMENSIONAL OUTLINE (3) (High Voltage Power Supply)

Unit : mm



CONNECTOR FOR POWER SUPPLY Unit : mm

	Terminal	Terminal cover	Washer	O-Ring
Anode	WINCHESTER 100-51020S	Cap; M14, Pitch; 1 Depth; 10	ID;φ8.5 OD;φ12.5 Thickness; 0.5	ID;φ4.8 Thickness;φ1.9
G3	WINCHESTER 100-51020S	Cap; 5/16-32UNF Depth; 8	ID;φ5.0 OD;φ7.0 Thickness; 0.5	ID;φ2.8 Thickness;φ1.9
G2	AMP 170331-1	Cover; AMP 172074-1	—	—
G1	AMP 170331-1	Cover; AMP 172074-1	—	—
PC	AMP 170331-1	Cover; AMP 172074-1	—	—
GND	AMP 170331-1	Cover; AMP 172074-1	—	—
IP	WINCHESTER 100-51020S	Cap; 5/16-32UNF Depth; 8	ID;φ5.0 OD;φ7.0 Thickness; 0.5	ID;φ2.8 Thickness;φ1.9

ID : Inner diameter, OD : Outer diameter

RECEPTACLE SIZE Unit : mm

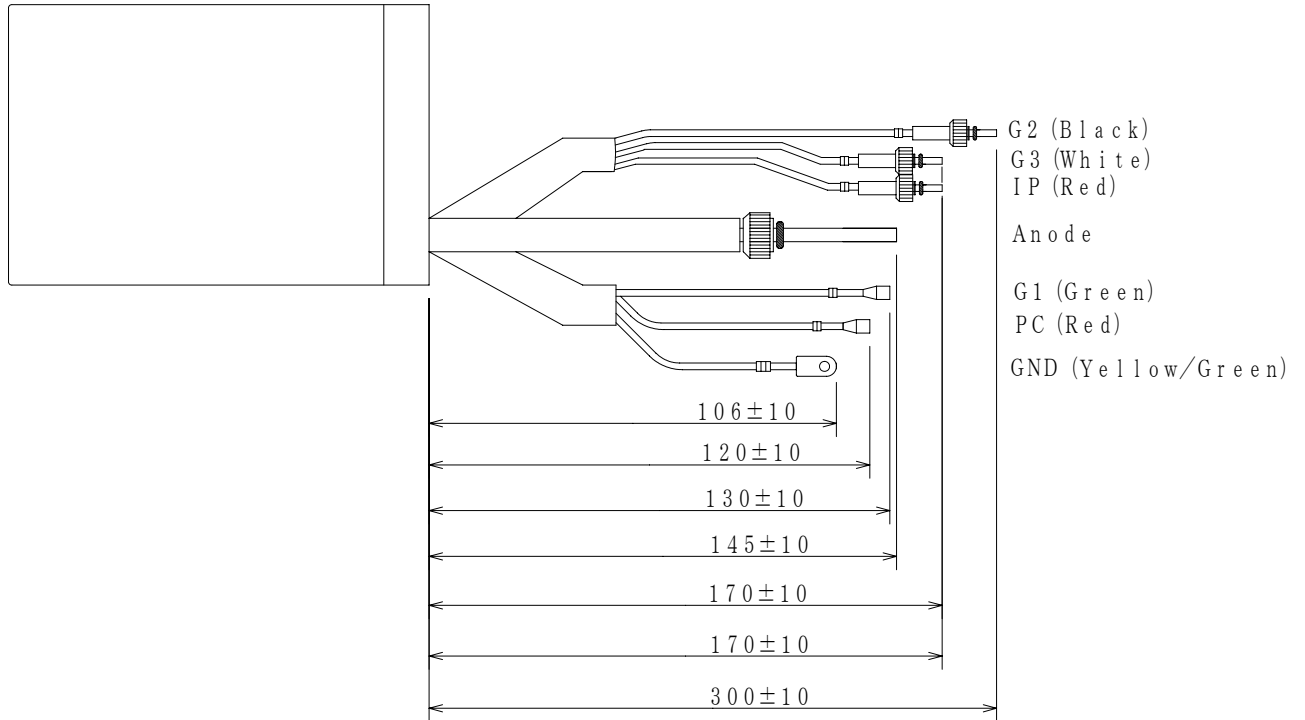
	ID	Depth
Anode	φ8.5	53
G3	φ5.0	26.5
IP	φ5.0	26.5

See to page 5.

DIMENSIONAL OUTLINE (4)

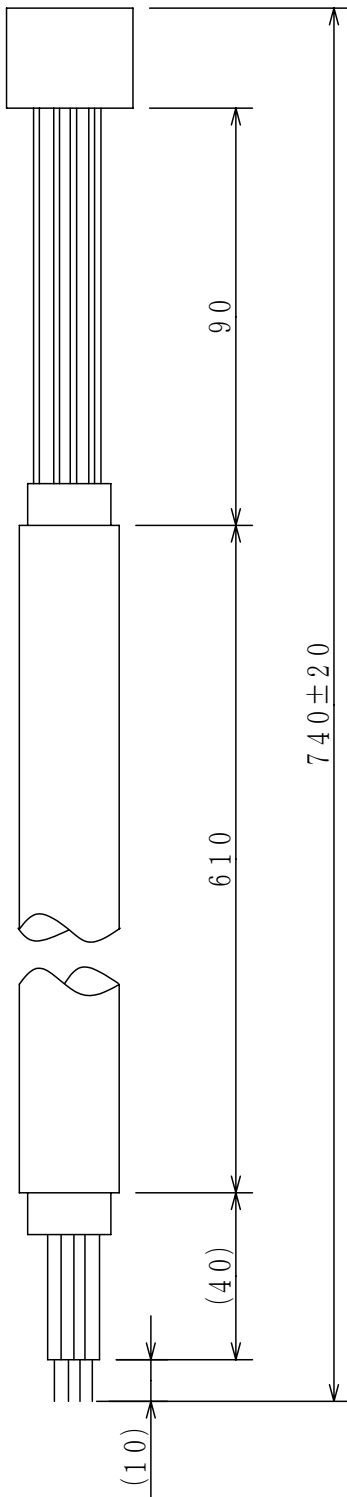
(Cable)

Unit : mm



	Terminal
Anode	Winchester 100-51020S
G3	Winchester 100-51020S
G2	Winchester 100-51020S
IP	Winchester 100-51020S
G1	Thomas & Betts RA25177
PC	Thomas & Betts RA25177
GND	Thomas & Betts RA18-6

DIMENSIONAL OUTLINE (5)



CN1 Pin	Connection	Cable Color
1	+24V	Red
2	0 V (GND)	Green
3	M	Pink
4	COM	Yellow

OVERSEAS SUBSIDIARIES AND AFFILIATES

EU REPRESENTATIVE

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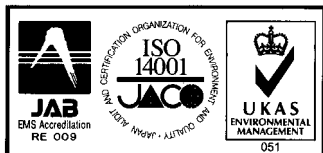
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Standard ISO 14001



Toshiba Electron Tubes & Devices Co., Ltd meets internationally
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ISO 9001, ISO 13485

