

**ROTANODE  
E7254X  
E7254FX  
E7254GX  
E7254JX**



## Rotating Anode X-Ray Tube Housing Assembly

- ◆ High speed rotating anode X-ray tube housing assembly for high energy radiographic and cine-fluoroscopic operations.
- ◆ The heavy anode is constructed with specially processed Rhenium-tungsten faced molybdenum target which have an improved coating to increase thermal emissivity.
- ◆ These tubes have foci 1.2 mm and 0.6 mm, and are available for a maximum tube voltage 150 kV with or Three-phase generator.
- ◆ Accommodated with IEC 60526 type high-voltage cable receptacles.



## General Data

**IEC Classification** ..... **Class I**

### Electrical:

Circuit (Center-grounded) ..... Three-phase full-wave rectified

Operating Tube Voltage:

Radiographic ..... 40 ~ 150 kV Max.

Fluoroscopic ..... 40 ~ 125 kV Max.

Focal Spot:

Large Focus ..... 1.2 mm

Small Focus ..... 0.6 mm

Input Energy ( at 0.1s ):

Large Focus ..... 102 kW

Small Focus ..... 40 kW

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Motor (Stator) Ratings <sup>1)</sup>:

Duty		Starting		Running	
Power source	(Hz)	180	60	180	60
Input power	(W)	3500	1520	90	80
Voltage <sup>2)</sup>	(V)	490	300	165	160
Current	(A)	9.0	7.6	1.3	1.1
Min. Speed up <sup>4)</sup>	(s)	2.0	1.0	-	-
Capacitor	( $\mu$ F)	6	30	6	30
Min. braking <sup>4)</sup>	(s)	2.5 s / 300 V (DC)			

Note: 1) This table is an example of recommendable ratings which are measured with the AID starter model RC103. If you drive the tube with different conditions, please check with Toshiba X-ray tube engineering.

2) The every applied voltage must be never exceeded 110% of the above specification.

3) No more than two high speed starts per minute are permissible.

4) The speed-up and braking time are allowed up to 110% of the above specification.

## Anode Speed:

50 Hz	2700 min <sup>-1</sup> Min.
60 Hz	3200 min <sup>-1</sup> Min.
180 Hz	9700 min <sup>-1</sup> Min.

## Stator resistance

Common-Main Winding	20.2 $\Omega$
Common-Auxiliary Winding	38.0 $\Omega$
Resistance between Housing and Low Voltage Terminals	2 M $\Omega$ Min.
Normal operating range of the housing temperature	16 ~ 75 °C
Thermal Switch	Normally Closed
Open	75 ~ 85 °C
Closed	45 ~ 65 °C

**Mechanical:**

Dimensions:	See dimensional outline
Overall Length	462 mm
Maximum Diameter	172 mm
Target Angle	12 degrees
Permanent Filtration	0.8 mm Al / 75 kV IEC 60522 / 2003
Radiation Protection (To meet the requirements of IEC 60601-1-3):	
Leakage Technique Factor	150 kV 5 mA
X-ray Coverage	354 × 354 mm at SID 835 mm
Weight (Approx.)	25 kg
High Tension Terminals	To meet the requirements of IEC 60526
Cooling Method	Natural or forced air
Tube Housing Model Number	XH-157

## Absolute Maximum and Minimum Ratings

(At any time, these values must not be exceeded.)

### Maximum Tube Voltage:

Radiographic .....	150 kV
Fluoroscopic .....	125 kV

Maximum Voltage to Ground ..... 78 kV

Minimum Tube Voltage ..... 40 kV

### Maximum Tube Current:

Large Focus .....	1000 mA
Small Focus .....	500 mA

### Maximum Filament Current:

Large Focus .....	5.5 A
Small Focus .....	5.2 A

### Filament Voltage:

Large Focus (At max. filament current 5.5 A) .....	12.7 ~ 17.1 V
Small Focus (At max. filament current 5.2 A) .....	7.0 ~ 9.4 V

Filament Frequency Limits ..... 0 ~ 25 kHz

Average Input Power <sup>1)</sup> ..... 300 W (423 HU/s)

(Fluoroscopic, repeated radiographic or mixed exposure)

### Thermal Characteristics:

Anode Heat Storage Capacity ..... 285 kJ (400 kHU)

Maximum Anode Heat Dissipation Rate ..... 1180 W (1664 HU/s)

Housing Heat Storage Capacity ..... 856 kJ (1207 kHU)

Maximum Housing Heat Dissipation Rate <sup>2)</sup>:

Without Air-circulator ..... 132 W (11 kHU/min)

Note: 1) "Average Input Power" is the X-ray tube anode input power.

Therefore, when tube is used for long time exposure or frequent exposures, the stator input power and filament heating power need to be calculated not to exceed the "Housing Heat Storage Capacity".

2) "Maximum Housing Heat Dissipation Rate" is specified at 856 kJ of full housing heat storage which is generated by X-ray tube anode input power, stator input power and filament heating input power.

## Environmental Limits

### Operating Limits:

Temperature .....	10 ~ 40°C
Humidity .....	30 ~ 85 %
	( No condensation )
Atmospheric Pressure .....	70 ~ 106 kPa

### Shipping and Storage Limits:

Temperature .....	-20 ~ 70°C
Humidity .....	20 ~ 90 %
	( No condensation )
Atmospheric Pressure .....	50 ~ 106 kPa

## Warning

### Warning to Interface with X-ray Generator

#### 1. Housing Rupture

Never input over-rated power to x-ray tube assembly.

If the input power is extremely higher than specification, it may cause the over temperature of anode, insert tube glass shatter and ultimately the following serious problems due to generating over-pressure by oil vaporization inside housing assembly.

In such a critical condition, the safety thermal switch can not protect x-ray tube even if it works.

- \* Housing sealing parts (cathode side) rupture
- \* Human injury including burns due to hot oil escape
- \* Fire accident due to flaming anode target

We strongly request that the x-ray generator should have a protective function which manages input power to x-ray tube assembly.

## Cautions

### Caution to Interface with X-ray Generator

1. Over Rating

X-ray tube assembly can be broken with applying just one over rated shot.  
Please read the technical data sheets carefully and follow the instructions.

2. Inherent Filtration

The total filtration and the distance between x-ray focal spot and human body are regulated legally.  
They should be complied with the regulation.

3. Safety Thermal Switch

X-ray tube assembly has safety thermal switch to prohibit further input power when the tube housing reaches to the temperature of switch-open.

The switch should be hooked up with the x-ray generator which control output power to x-ray tube assembly.

Even if the switch works, never turn the system power off and the cooling unit should be activated.

4. Unexpected Malfunction

X-ray tube assembly may have the risk to be unexpectedly malfunctioning due to life termination or failure. If the serious problems caused by the above risk is expected, we recommend to have a contingency plan to avoid such a case.

5. New Application

If you use the product with new application not to be mentioned in this specification or with different type of x-ray generator, please contact to us for confirming its availability.

## Caution for Installation, Adjustment and Maintenance

### 1. Qualified Persons

Only qualified persons who have technical training and professional knowledge can handle x-ray tube assembly.

### 2. Fragile Glass

X-ray tube is assembled with glass, therefore, it can be broken with the mechanical vibration or pulsed shock over  $19.6\text{m/s}^2$  (2G).

Careful handling is required to treat or transport.

### 3. Ground Terminal

X-ray tube assembly has ground terminal. Ground cable should be connected.

### 4. High Voltage

All x-ray tubes operate at voltages high enough to kill through electrical shock. Never touch the high voltage delivered plugs or terminals.

When direct access to such parts is required, the primary circuit should be disabled and high voltage capacitors/cables discharged.

### 5. High Voltage Plug

High voltage plug should be cleaned up and free from any physical damages. Silicon compound application is required for high voltage stability.

### 6. Operation Atmosphere

X-ray tube assembly is not allowed to use in the atmosphere of flammable or corrosive gas.

### 7. Protective Cover

X-ray tube assembly is not allowed to use without the protective cover attached.

### 8. Handling

Appropriate jig or tools are required for tube installation to avoid physical damages.

### 9. Returning Tube

X-ray tube assembly should be repackaged with the original material when it is returned back for quality examination in our factory.

Be careful to put the tube upside cathode. If the packaging is not proper, the tube may not be correctly examined.

### Caution in Operation

1. X-Ray Radiation

X-ray tube assembly should have the beam limiting equipment mounted on the x-ray port to protect unnecessary radiation.

2. Dielectric Oil

X-ray tube assembly has dielectric oil contained for high voltage stability. As it is poisonous for human health, if it is exposed to the non-restricted area, it should be disposed as following to the local regulation.

3. Operation Atmosphere

X-ray tube assembly is not allowed to use in the atmosphere of flammable or corrosive gas.

4. Lead Disposition

X-ray tube housing is lined with lead to protect unnecessary radiation. 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.

5. X-ray Tube Housing Temperature

Do not touch on X-ray tube housing surface just after operation due to high temperature.  
Stay X-ray tube to be cooled.

6. Any Malfunction

Please contact to your system service person immediately, if any malfunction is noticed.

## Caution Label

- (a) This label is a caution label to notify the user of the following point.  
"Housing end cap is used to protect the electric shock and x-ray leakage."

Attachment position : X-ray tube assembly housing end cap

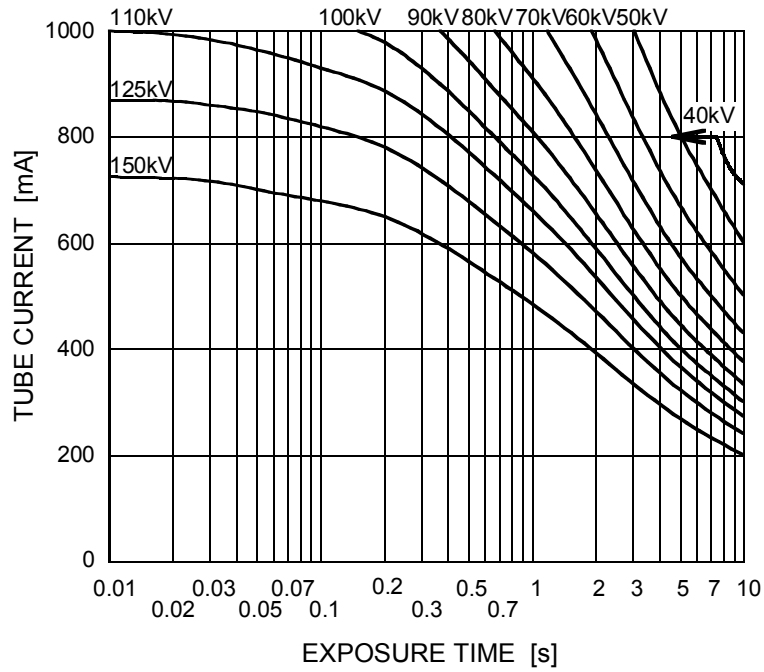


## Maximum Rating Charts

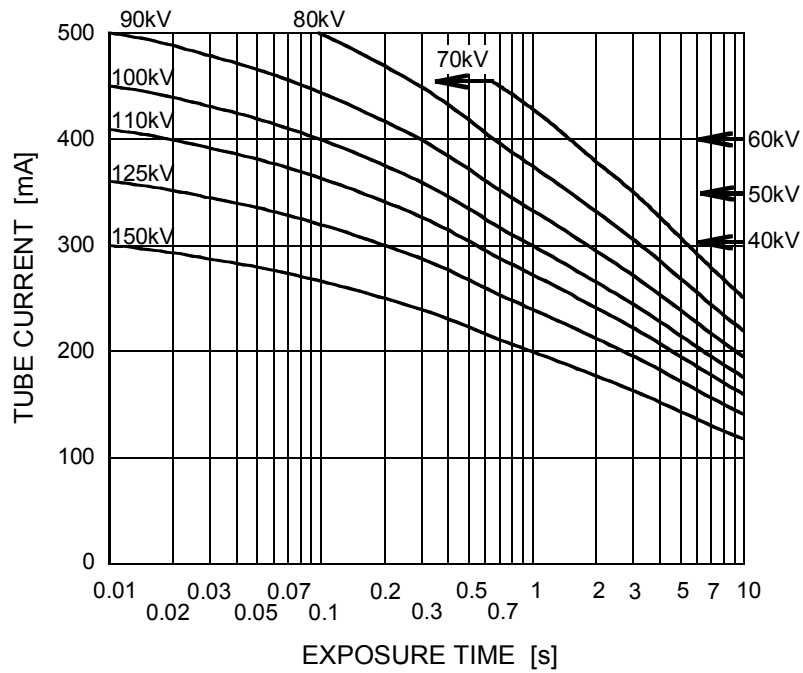
(Absolute Maximum Rating Charts)

Conditions: Tube Voltage Three-Phase  
 Stator Power Frequency 180 Hz

Focal Spot : 1.2 mm



Focal Spot : 0.6 mm



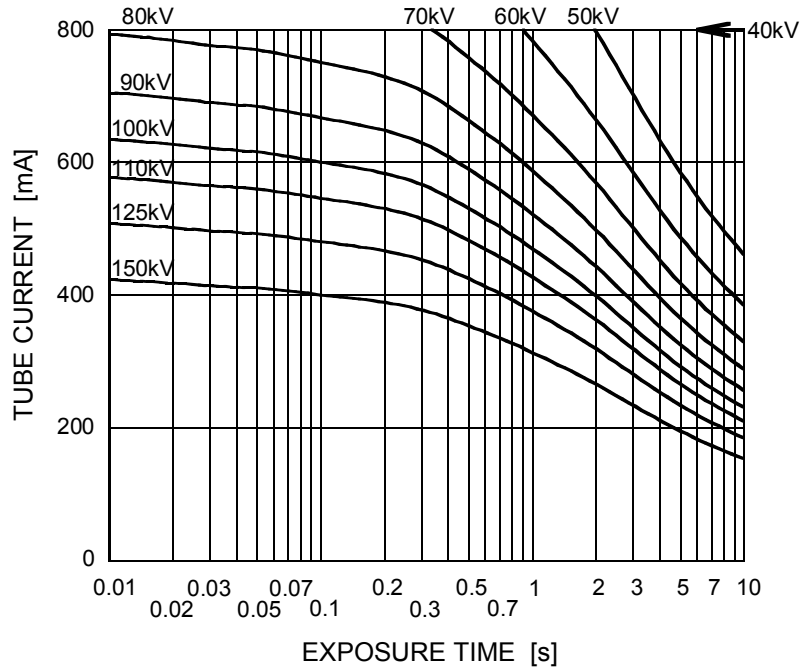
## Maximum Rating Charts

(Absolute Maximum Rating Charts)

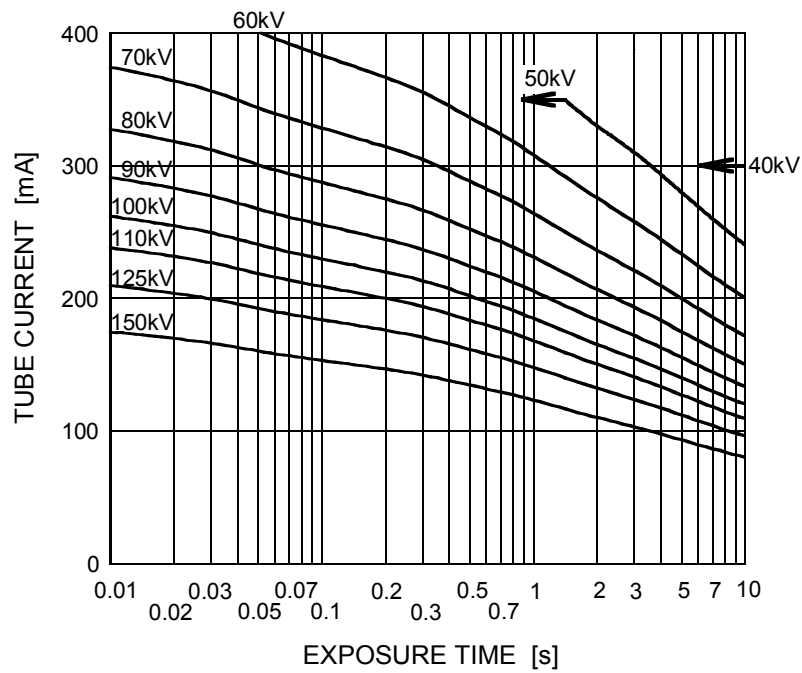
Conditions: Tube Voltage Three-Phase

Stator Power Frequency 60 Hz

Focal Spot : 1.2 mm



Focal Spot : 0.6 mm



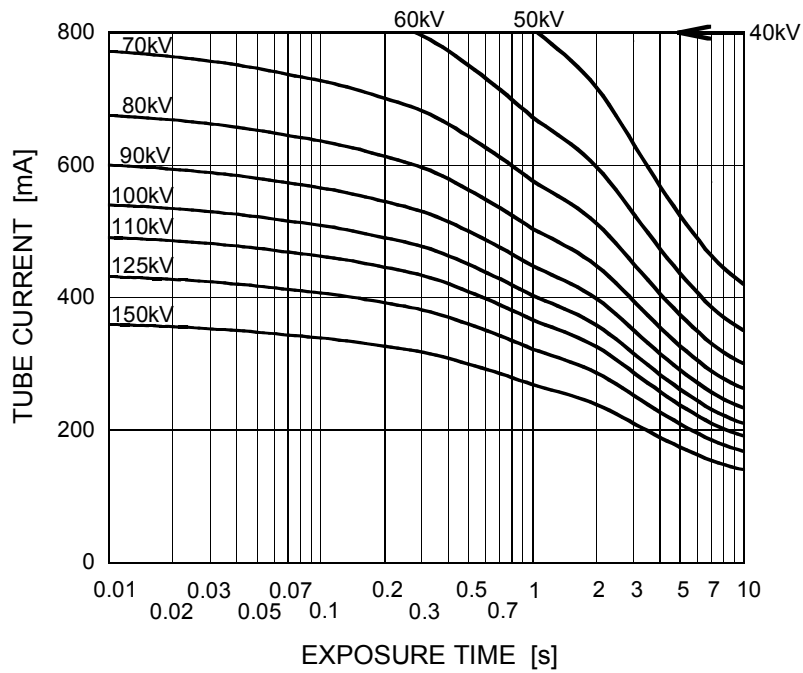
### Maximum Rating Charts

(Absolute Maximum Rating Charts)

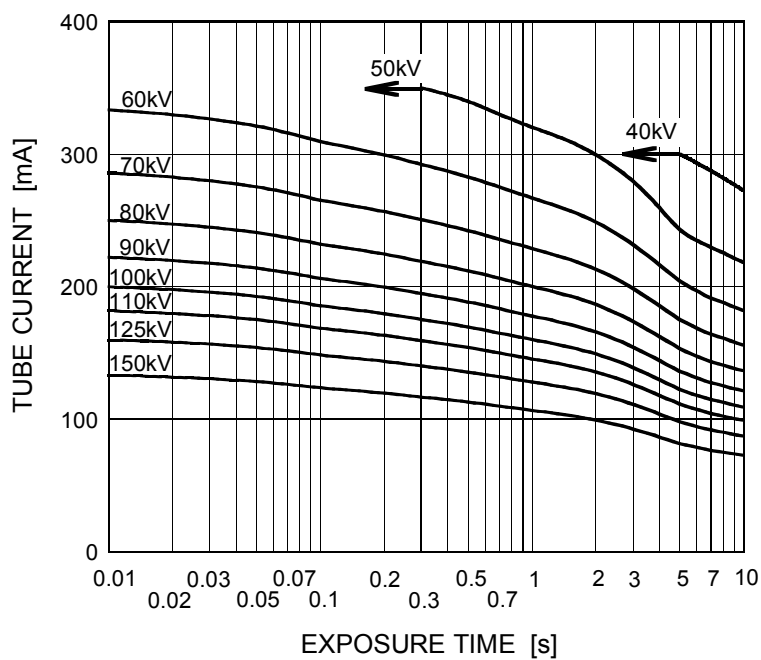
Conditions: Tube Voltage Three-Phase

Stator Power Frequency 50 Hz

Focal Spot : 1.2 mm



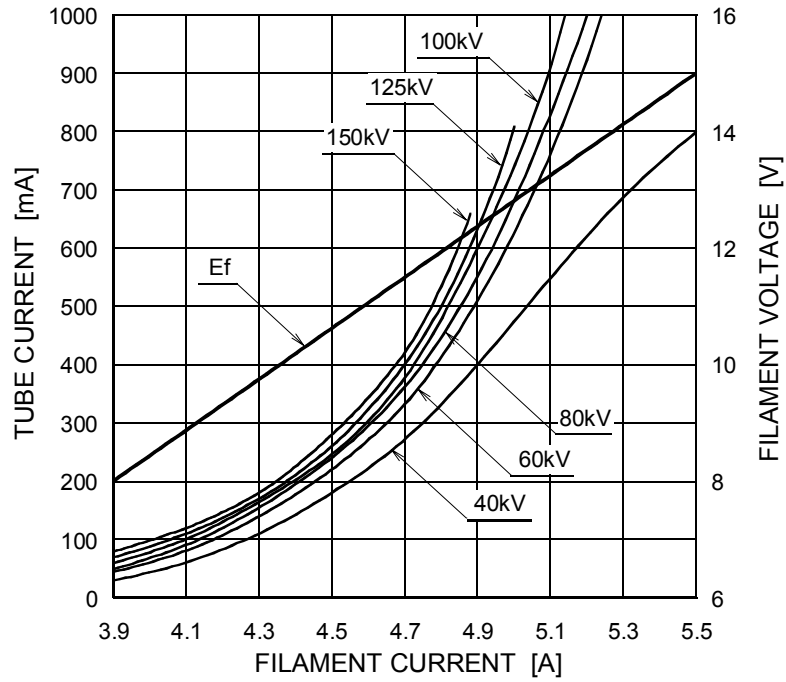
Focal Spot : 0.6 mm



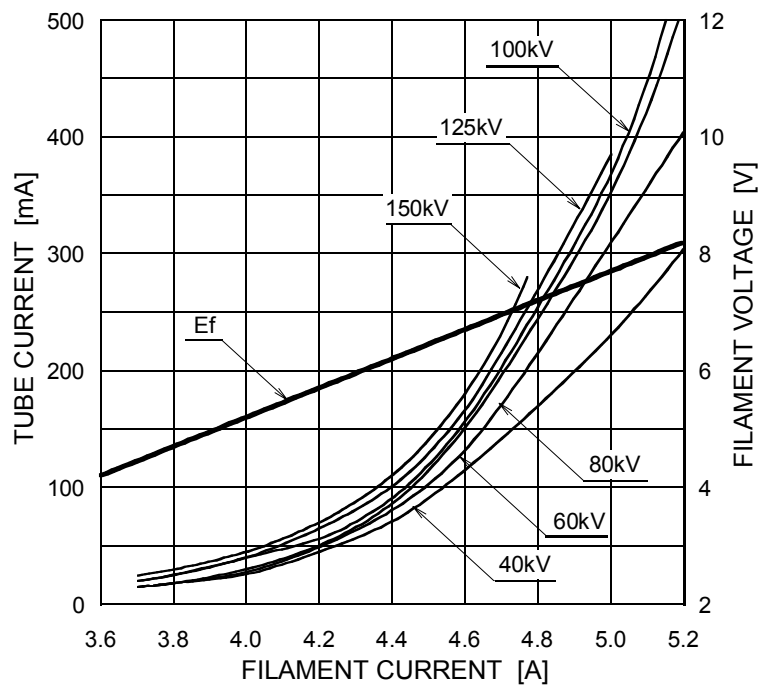
## Emission & Filament Characteristics

Three-Phase

Focal Spot : 1.2 mm

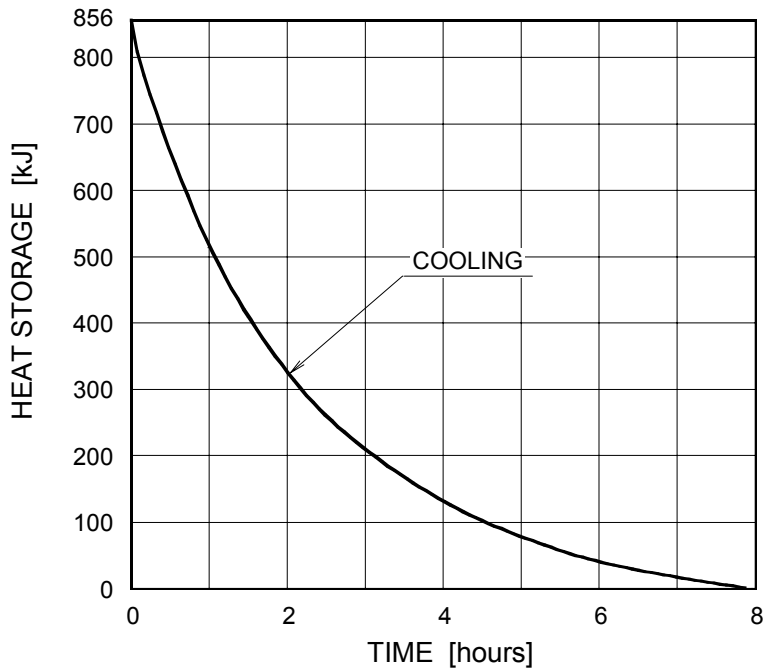


Focal Spot : 0.6 mm

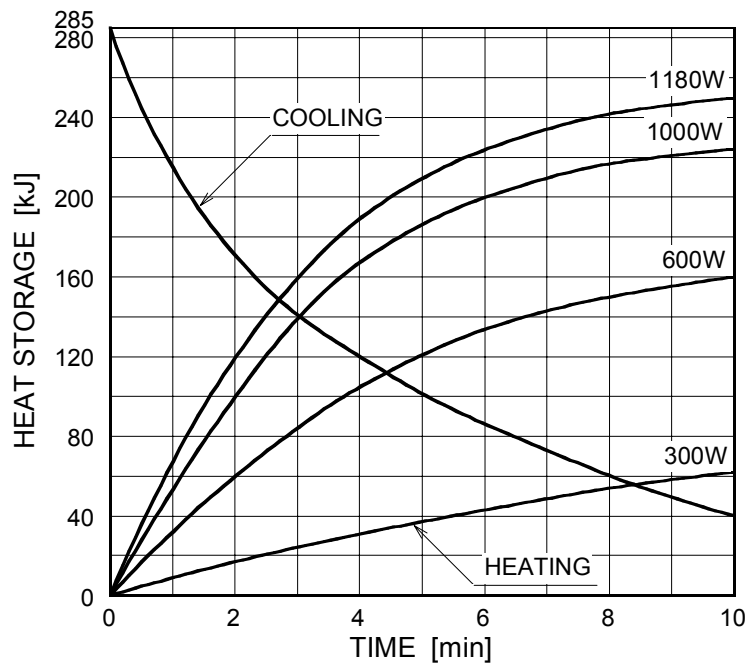


## Thermal Characteristics

Housing Thermal Characteristics



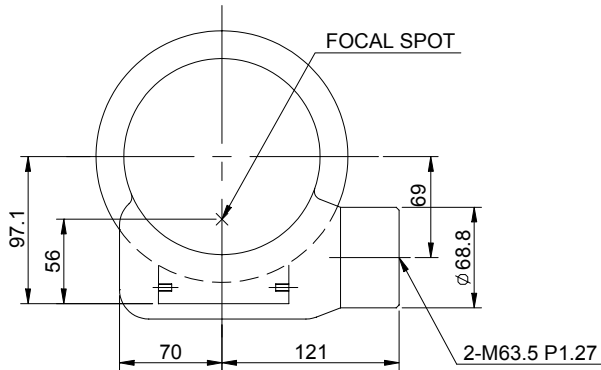
Anode Thermal Characteristics



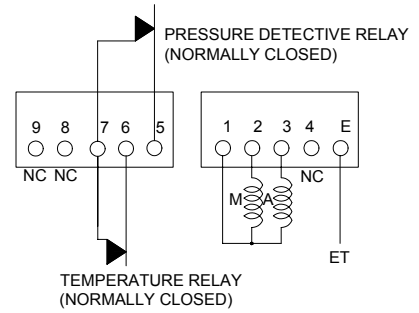
The heating curves are showing examples of average input power to the anode in operation.

### Dimensional Outline of E7254X

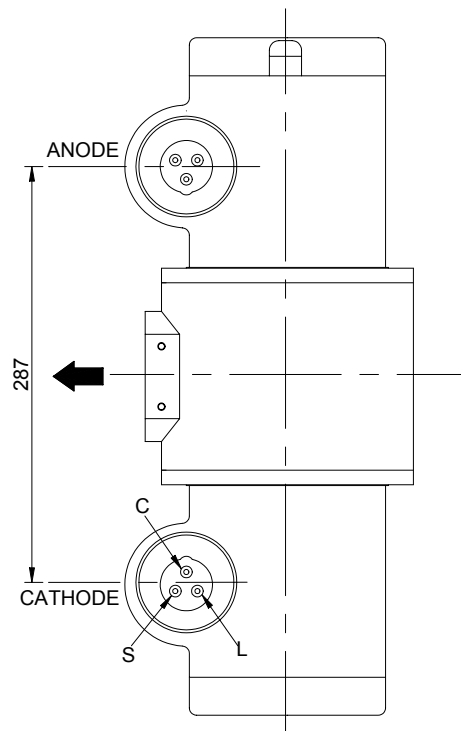
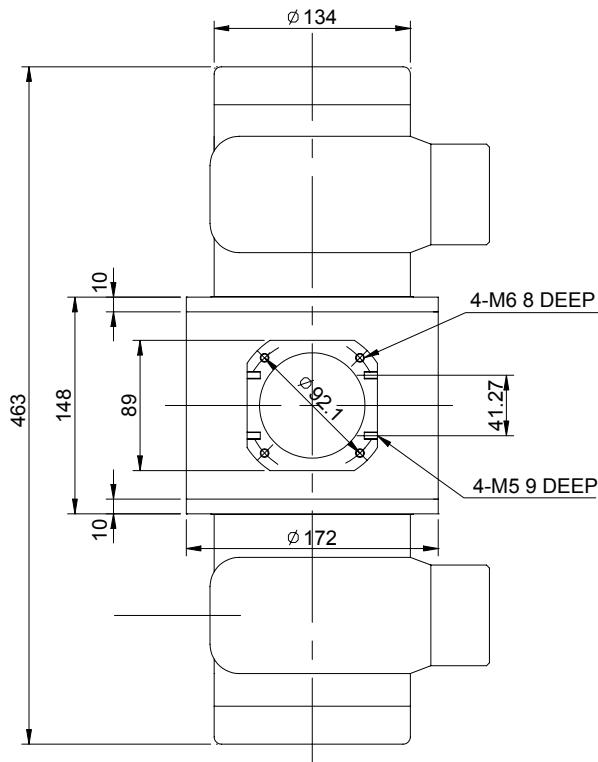
Unit mm



#### TERMINAL CONNECTIONS



Note) Do not connect terminal No.1 and No.5 or 6 in series circuit.

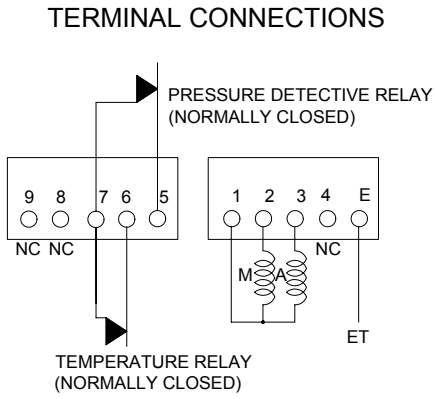


C : COMMON  
 L : LARGE FOCUS  
 S : SMALL FOCUS  
 M : MAIN WINDING OF THE STATOR  
 A : AUX. WINDING OF THE STATOR

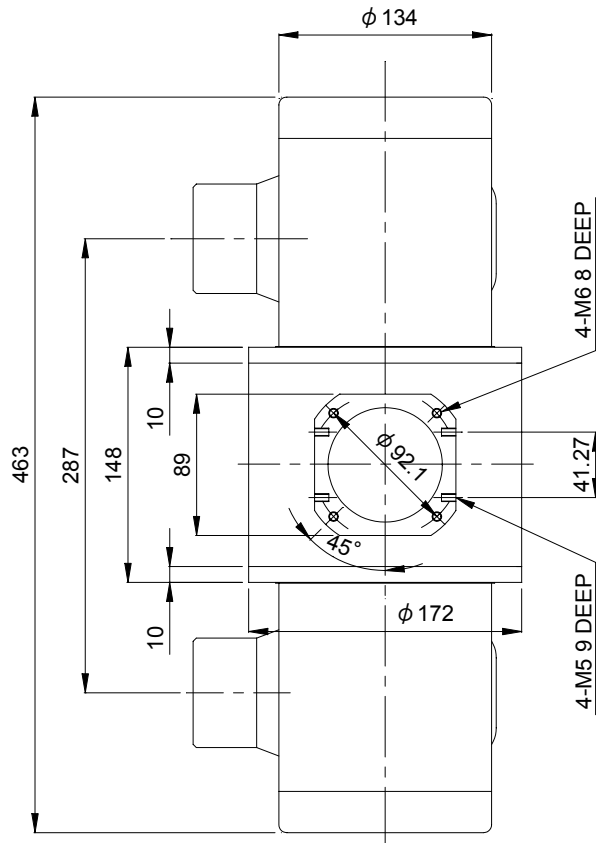
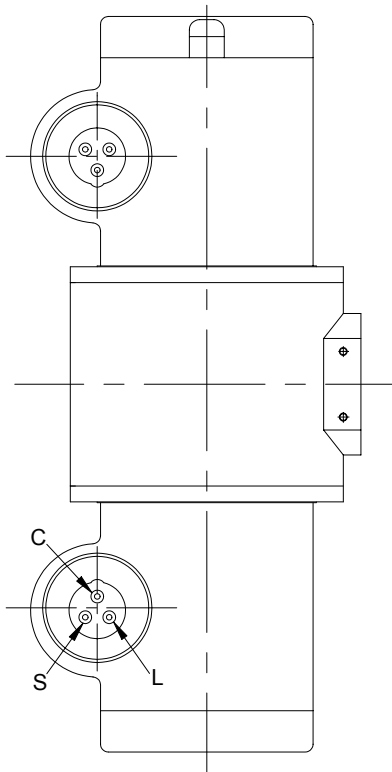
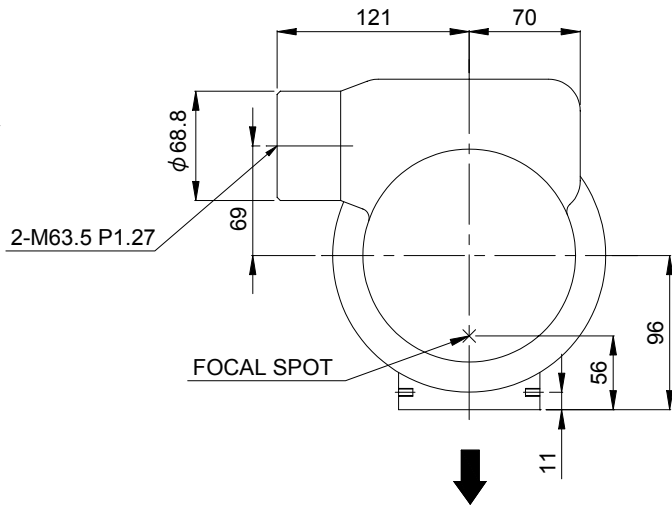
NC : NON-CONNECTION  
 ET : EARTH TERMINAL  
 ST : SHIELD TERMINAL (at cable clamp)  
 ▲ : CENTRAL X-RAY  
 ANODE & CATHODE TERMINAL  
 : IEC 60526 TYPE

### Dimensional Outline of E7254FX

Unit mm



Note) Do not connect terminal No.1 and No.5 or 6 in series circuit.



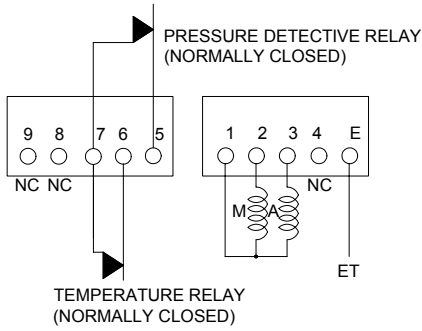
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 ST : SHIELD TERMINAL (at cable cramp)  
 ▲ : CENTRAL X-RAY  
 ANODE & CATHODE TERMINAL  
 : IEC 60526 TYPE

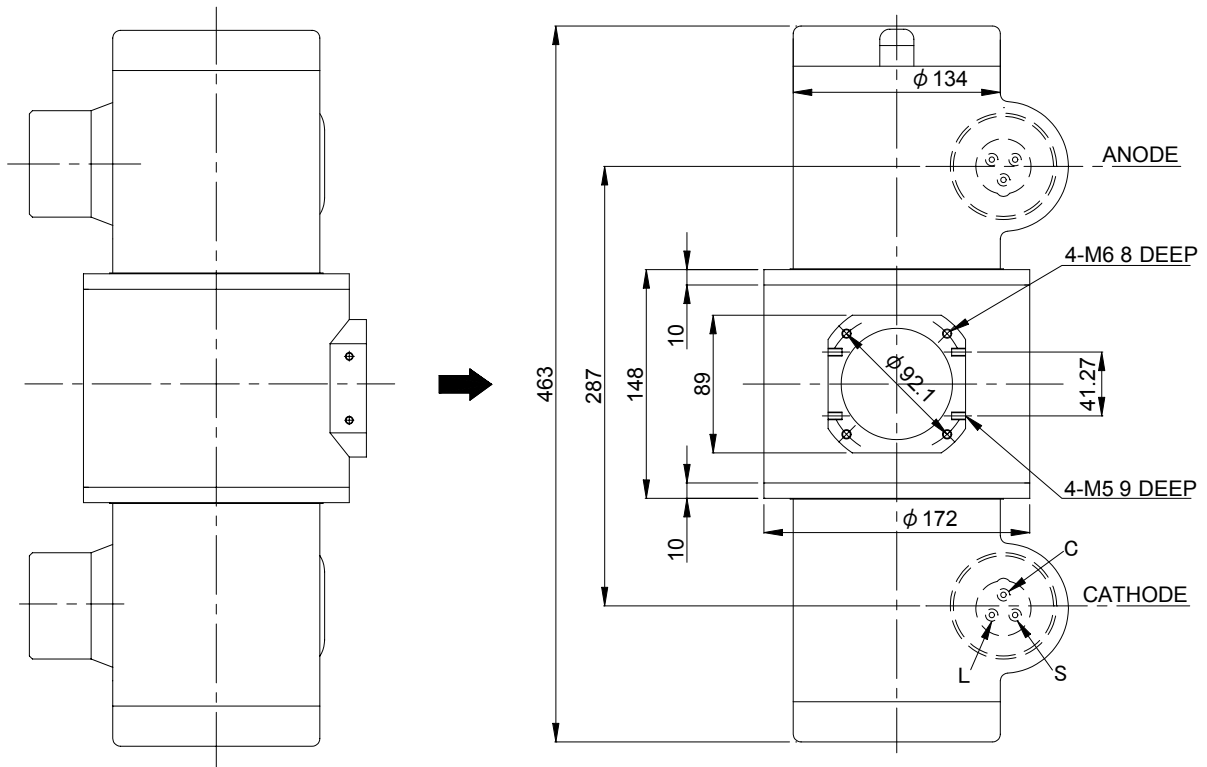
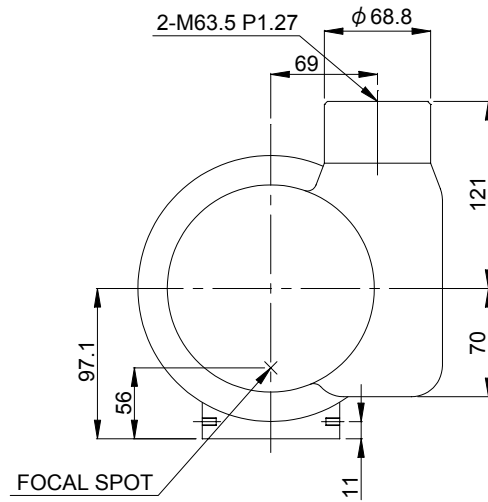
## Dimensional Outline of E7254GX

Unit mm

### TERMINAL CONNECTIONS



Note) Do not connect terminal No.1 and No.5 or 6 in series circuit.

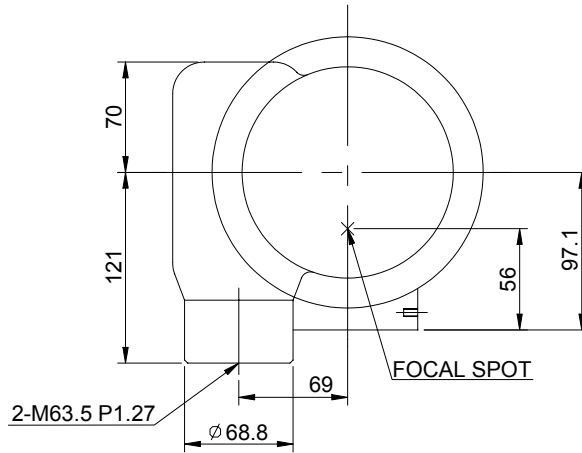
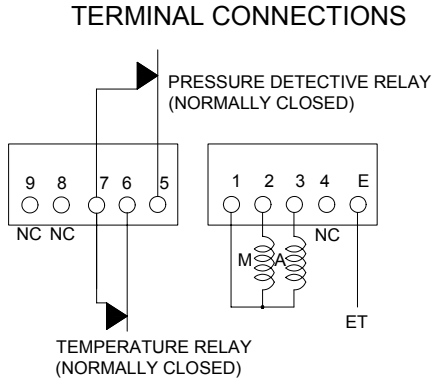


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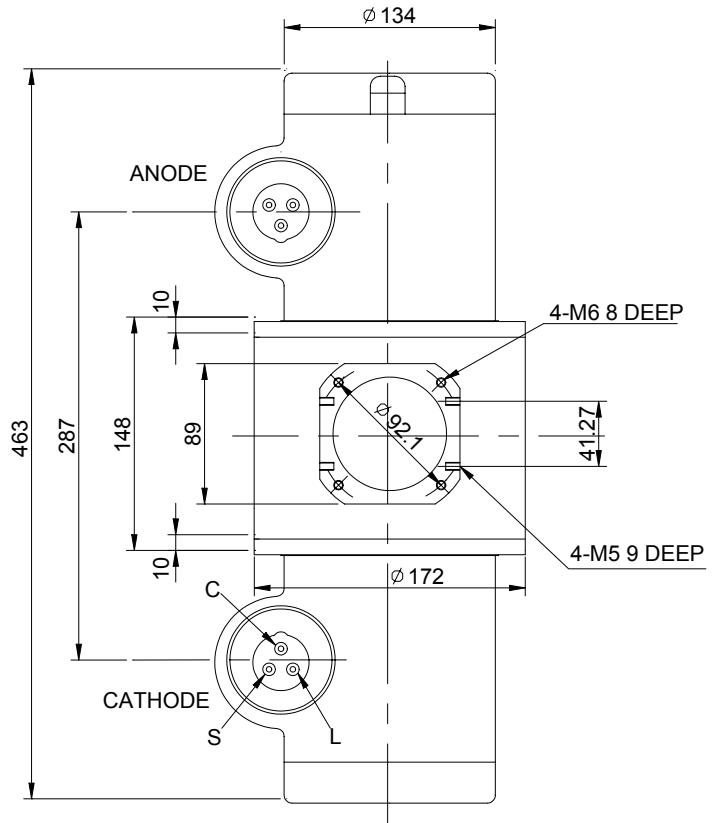
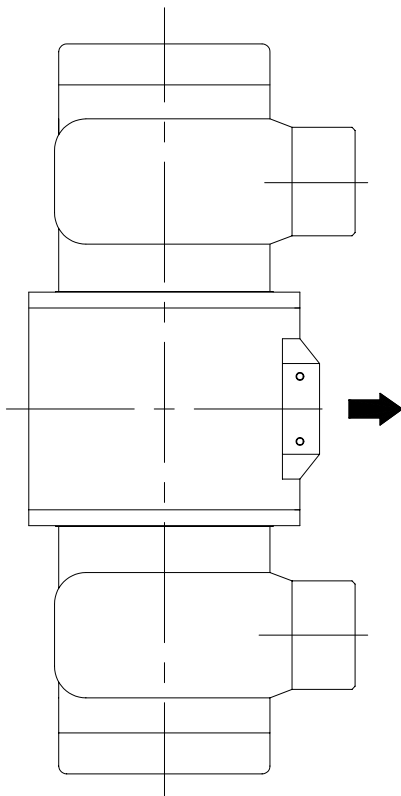
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 ET : EARTH TERMINAL  
 ST : SHIELD TERMINAL (at cable cramp)  
 ▲ : CENTRAL X-RAY  
 ANODE & CATHODE TERMINAL  
 : IEC 60526 TYPE

### Dimensional Outline of E7254JX

Unit mm



Note) Do not connect terminal No.1 and No.5 or 6 in series circuit.



C : COMMON  
L : LARGE FOCUS  
S : SMALL FOCUS  
M : MAIN WINDING OF THE STATOR  
A : AUX. WINDING OF THE STATOR

NC : NON-CONNECTION  
ET : EARTH TERMINAL  
ST : SHIELD TERMINAL (at cable clamp)  
▲ : CENTRAL X-RAY  
ANODE & CATHODE TERMINAL : IEC 60526 TYPE

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System Standard, ISO 14001



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