

**ROTANODE™  
E7290AX**

**Rotating Anode X-Ray Tube Assembly**

- ◆ Rotating anode X-ray tube assembly for magnification mammographic and soft X-ray radiographic operations.
- ◆ The insert tube has molybdenum target of 86 mm diameter anode disc and beryllium window.
- ◆ This tube has foci 0.3 and 0.1, and is available for a maximum tube voltage 39 kV.
- ◆ This tube assembly is accommodated with ALDEN P500 type high-voltage connector.



**General Data**

**IEC Classification (IEC60601-1:1988+Amd.1:1991+Amd.2:1995)**

..... **Class I ME EQUIPMENT**

**Electrical:**

Circuit:

High Voltage Generator ..... Constant Potential High-Voltage Generator  
 Grounding ..... Cathode-grounded

Nominal Tube Voltage:

Radiographic ..... 39 kV

Nominal Focal Spot Value: <sup>2)</sup>

Large Focus <sup>1)</sup> ..... 0.3

Small Focus <sup>1)</sup> ..... 0.1

- Note 1) Focal spots are defined on the central ray.  
 2) The tube is biased to obtain the Focal Spot.

Nominal Anode Input Power (at 0.1s):

..... 180 Hz  
 Large Focus ..... 3.1 kW  
 Small Focus ..... 1.0 kW

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Motor Ratings:

Stator: XS-AL

		Starting		Running	
		180	50/60	180	50/60
Driven Frequency	[Hz]	180	50/60	180	50/60
Input Power	[W]	1100	2150	83	75
Voltage <sup>3) 5)</sup>	[V]	220	200	60	40
Current <sup>4)</sup>	[A]	5.7	11.0	1.6	2.1
Min. Speed Up <sup>1) 7)</sup>	[s]	2.0	0.5	—	—
Capacitor	[μF]	6	44	6	44
Braking Time <sup>2) 7)</sup>	[s]	3 s / 70 V (DC)			

Note 1) The speed up time from normal speed to high speed is 2/3 times of the specified speed up time from 0 to high speed, which is described on motor rating table.

2) To be applied for high speed rotation.

3) Applied voltage between common and main terminal.

4) Common Current.

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

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

7) The speed-up time is allowed up to 110% of the above specification.

Anode Speed:

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

Resistance between Housing and Low Voltage Terminals ..... Minimum 2 MΩ

Normal operating range of the housing temperature ..... 16 ~ 75 °C

Mode of Operation ..... Intermittent

**Mechanical:**

Dimensions ..... See dimensional outline

Overall Length ..... 309 mm

Maximum Diameter ..... 138 mm

Target:

Anode Angle:

Large Focus ..... 16 degrees

Small Focus ..... 10 degrees

Diameter ..... 86 mm

Construction ..... Molybdenum Alloy

Permanent Filtration ..... At equivalent 0.0 mm (Be 0.8 mm)

Radiation Protection (To meet the requirements of IEC60601-1-3):

Leakage Technique Factor ..... 39 kV, 4.9 mA

X-ray Coverage ..... See Dimensional Outline  
(Drawing of X-ray Coverage)

Weight (Approx.) ..... 10 kg

High Voltage Receptacle ..... ALDEN, P500

Low Voltage Receptacle ..... AMP #206705-1

Cooling Method ..... Natural air

## Absolute Maximum and Minimum Ratings

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

Maximum X-ray Tube Voltage:	
Radiographic .....	39 kV
Between Anode and Ground .....	39 kV
Minimum X-ray Tube Voltage .....	22 kV
Maximum X-ray Tube Current .....	See rating charts
Large Focus .....	110 mA
Small Focus .....	35 mA
Maximum Filament Current:	
Large Focus .....	3.9 A
Small Focus .....	3.9 A
Filament Frequency Limits .....	0 ~ 25 kHz
Long Time Maximum Input .....	120 W (170 HU/s)
Thermal Characteristics:	
Anode Heat Content .....	210kJ (300 kHU)
Maximum Anode Heat Dissipation .....	525 W (740 HU/s)
X-ray Tube Assembly Heat Content .....	610 kJ (860 kHU)
Maximum Continuous Heat Dissipation:	
Without Air-circulator .....	72 W (6 kHU/min)

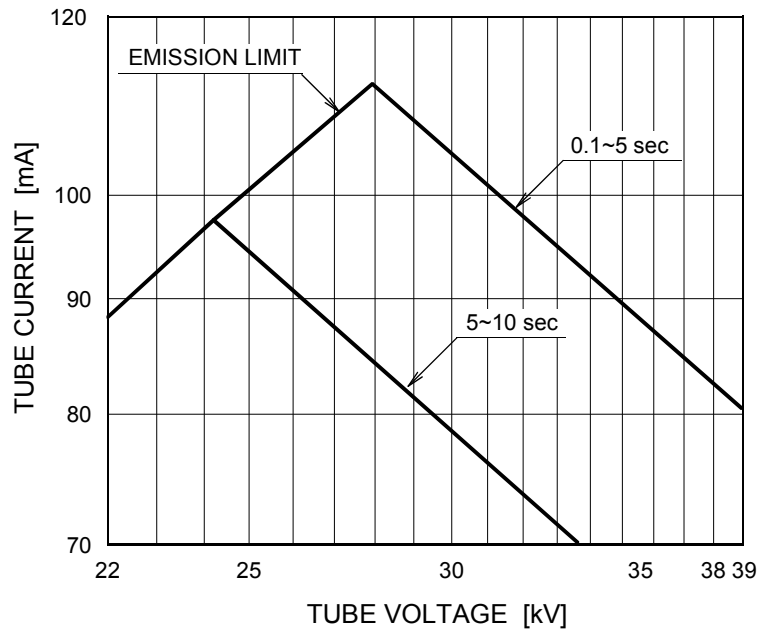
## Environmental Limits

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

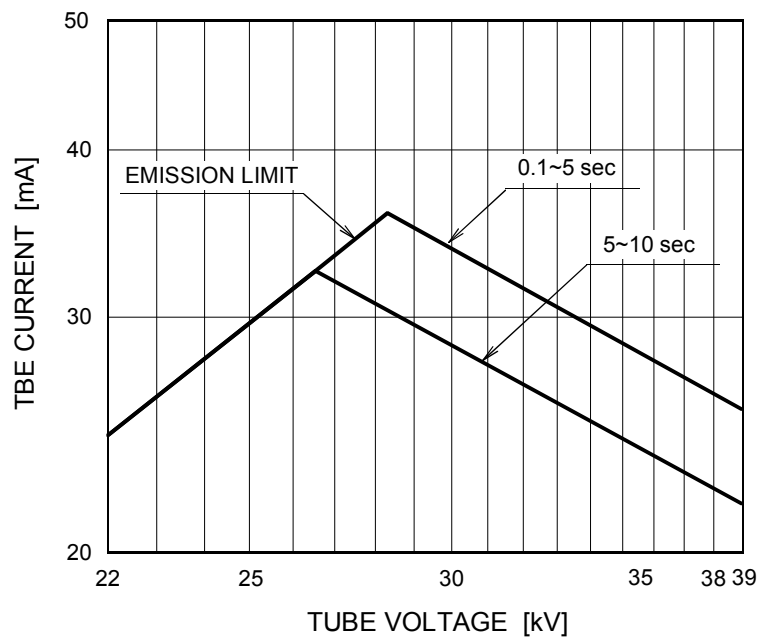
## Maximum Rating Charts (Absolute Maximum Rating Charts)

Conditions: Tube Voltage  
Constant Potential High-Voltage Generator  
Stator Power Frequency 180 Hz

Nominal Focal Spot Value: 0.3 ■



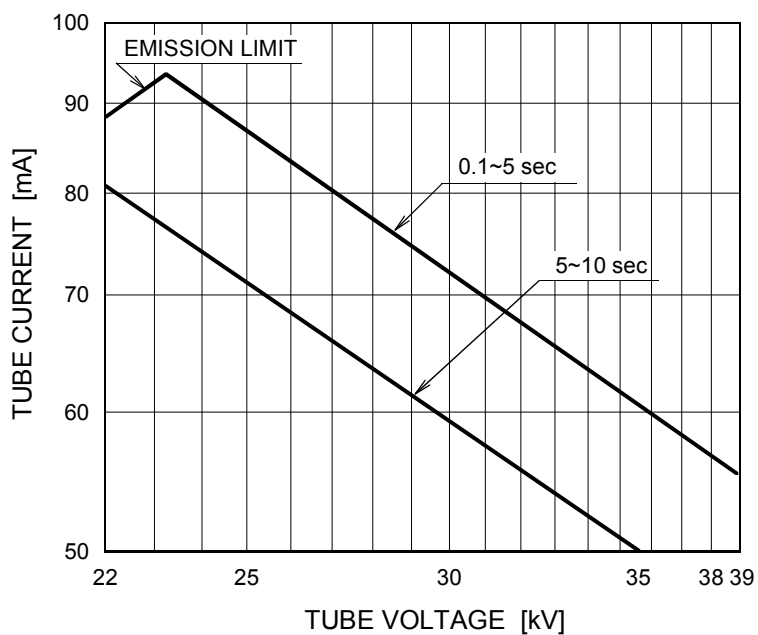
Nominal Focal Spot Value: 0.1 □



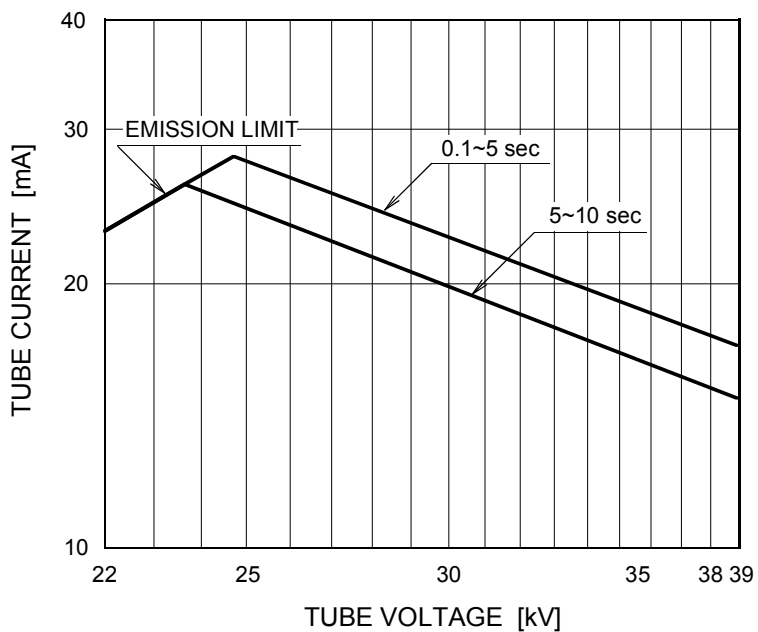
## Maximum Rating Charts (Absolute Maximum Rating Charts)

Conditions: Tube Voltage  
Constant Potential High-Voltage Generator  
Stator Power Frequency 60 Hz

Nominal Focal Spot Value: 0.3 ■



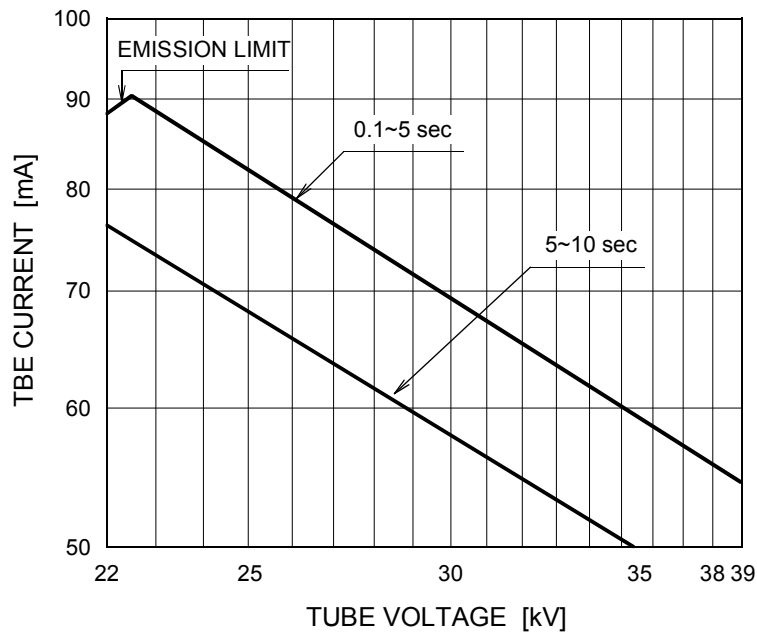
Nominal Focal Spot Value: 0.1 □



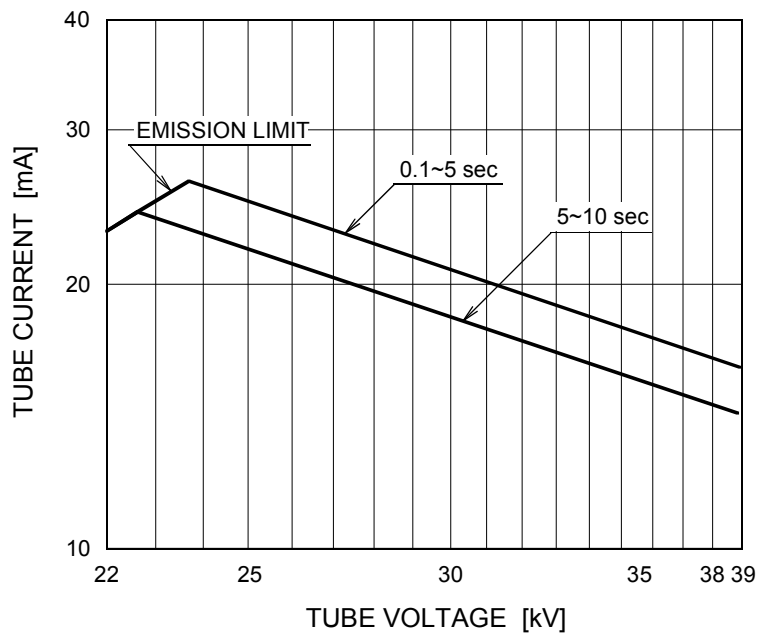
## Maximum Rating Charts (Absolute Maximum Rating Charts)

Conditions: Tube Voltage  
Constant Potential High-Voltage Generator  
Stator Power Frequency 50 Hz

Nominal Focal Spot Value: 0.3 ■



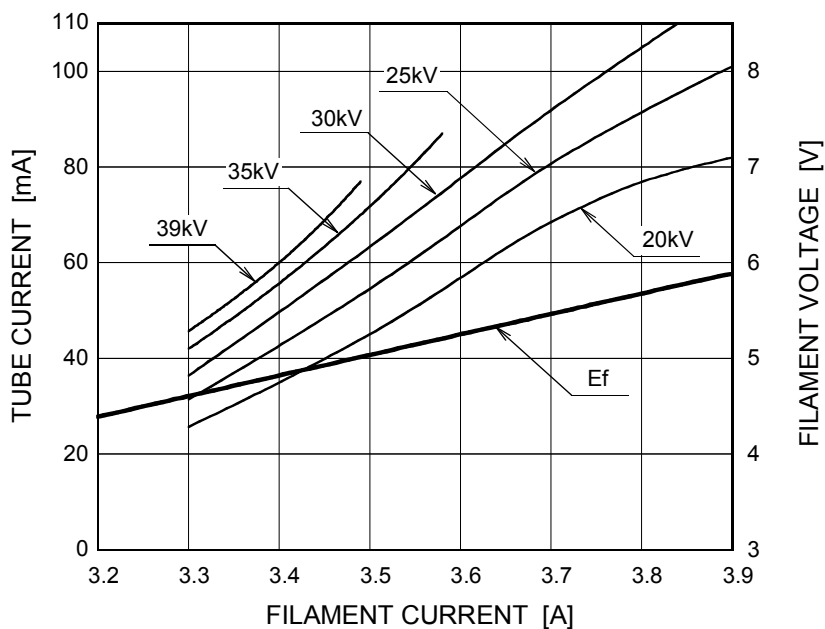
Nominal Focal Spot Value: 0.1 □



## Emission & Filament Characteristics

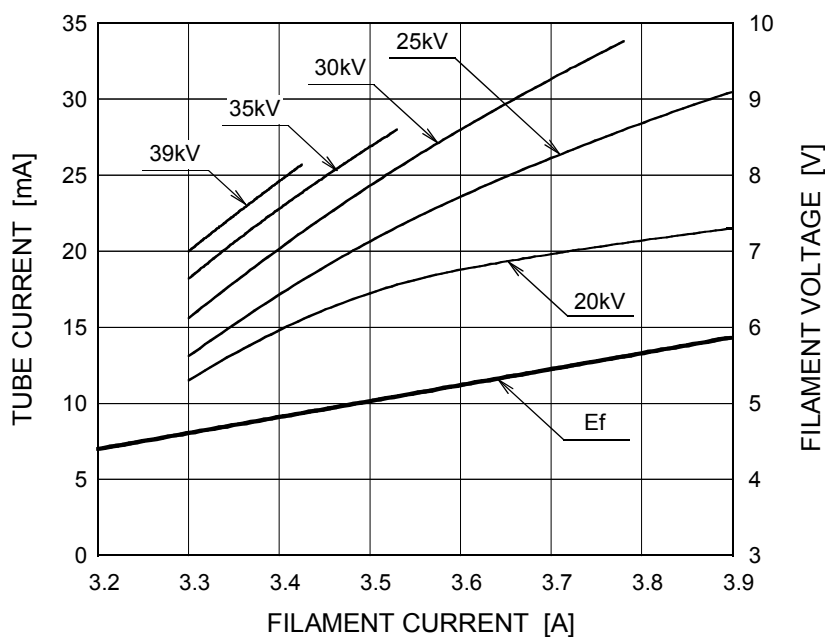
Constant Potential High-Voltage Generator

Nominal Focal Spot Value: 0.3 ■



For Reference Only

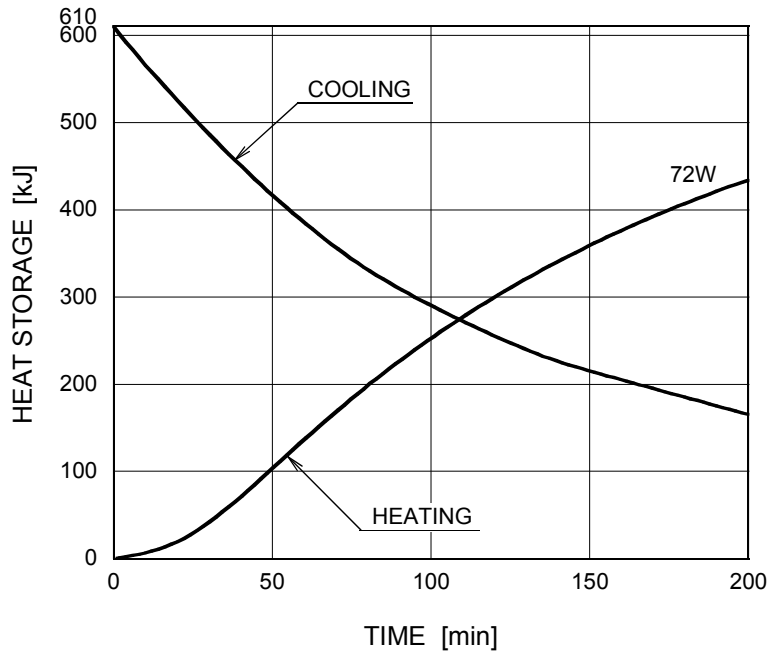
Nominal Focal Spot Value: 0.1 □



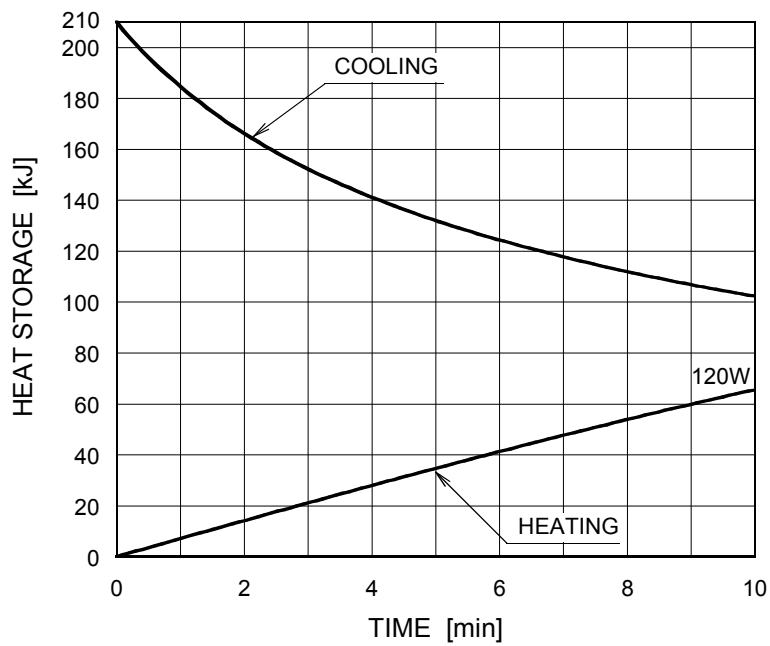
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## Thermal Characteristics

X-ray Tube Assembly Heating / Cooling Curve



Anode Heating / Cooling Curve

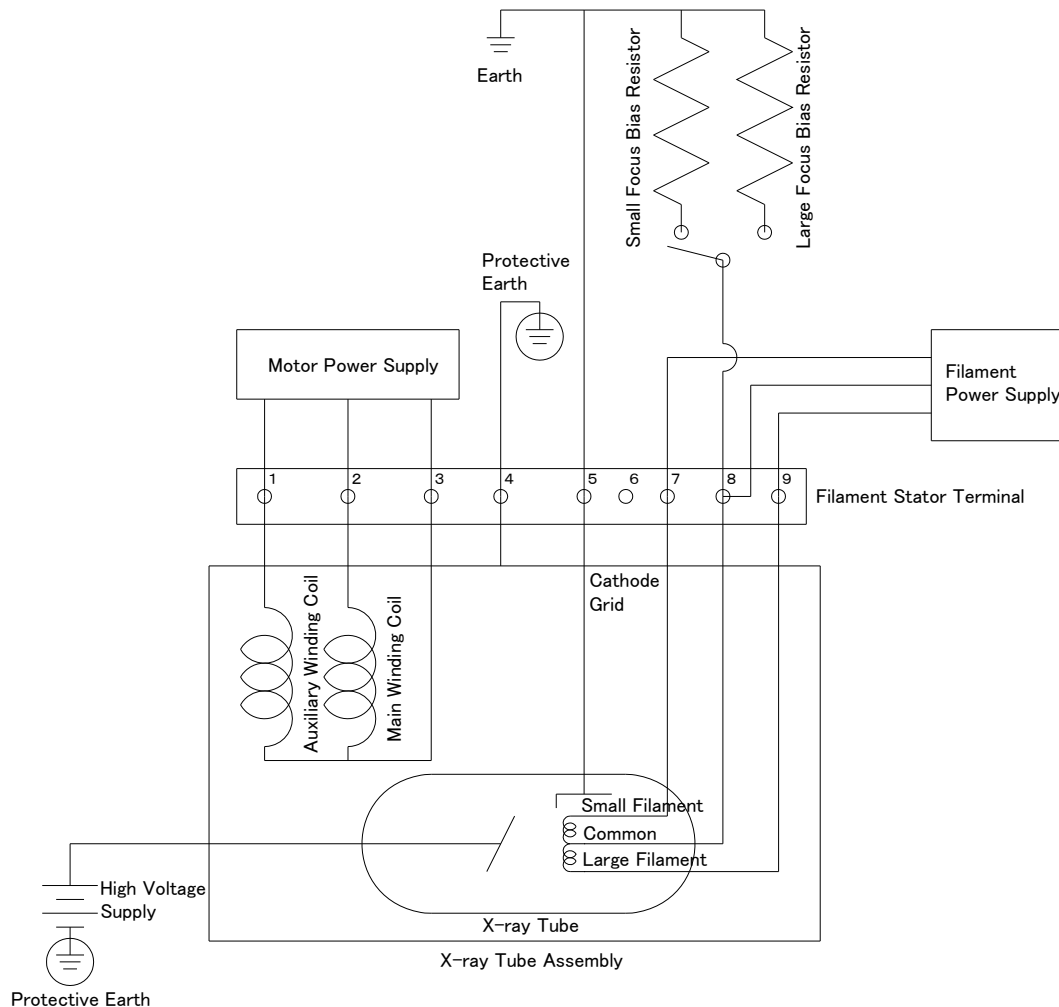


The heating curves are showing examples of average input power to the anode in operation.



## Self-Biasing Method (1) (With Self Bias Resistor)

### [1] Circuit Diagram



### [2] Bias Resistor

Bias resistor is specified by the inspection sheet of each tube.

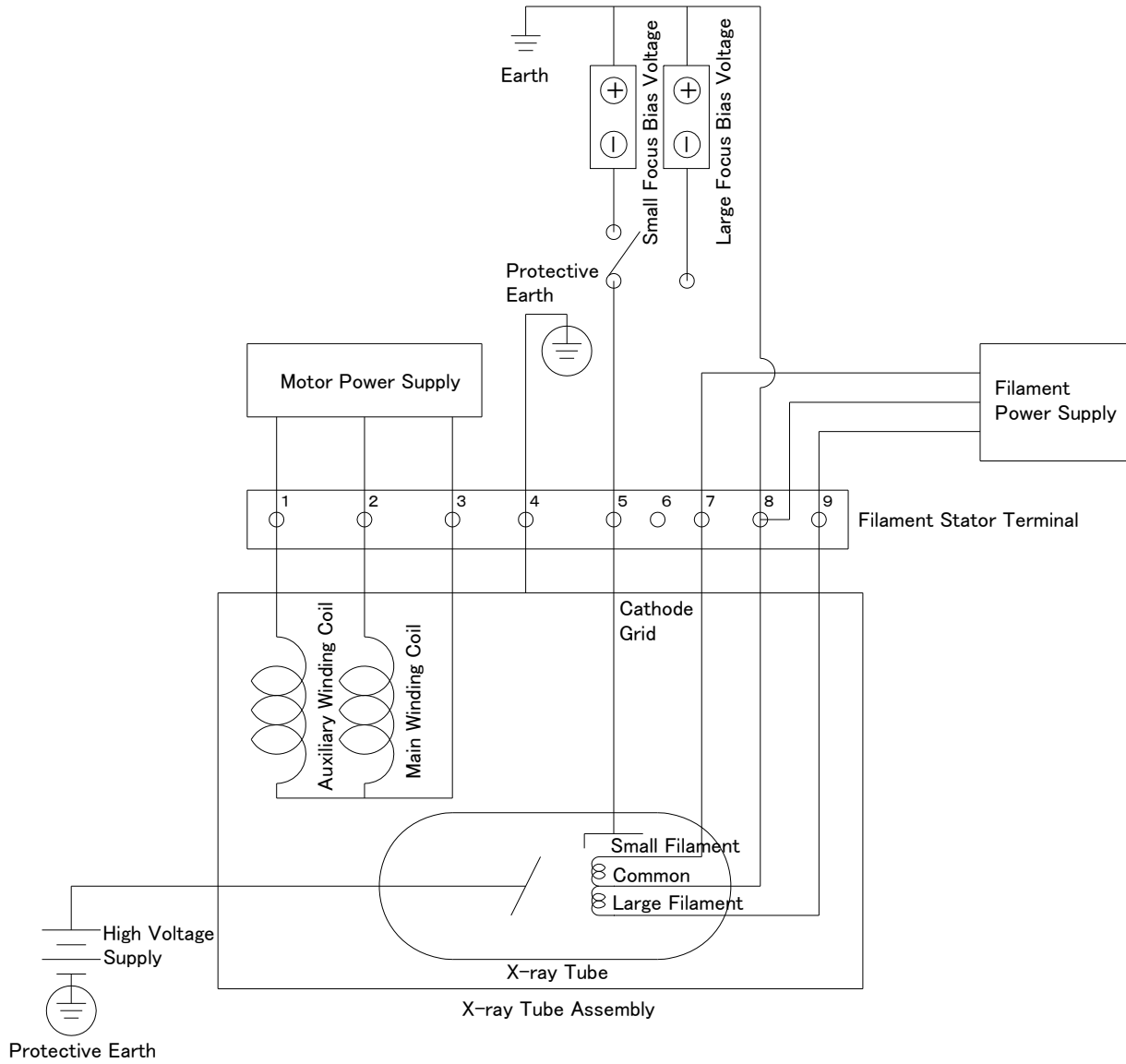
- (1) Large Focus : 0, 100, 200, 300, 390, 500, 600, 700, 800, 900, 1000 $\Omega$
- (2) Small Focus : 0, 0.5, 1, 1.5, 2, 2.4, 3, 3.6, 4k $\Omega$

### [3] Bias Resistor Connection

- (1) The filament common-terminal (Terminal No.8) shall be connected to the grid-terminal (Terminal No.5) through the bias resistor.
- (2) The grid-terminal (terminal No.5) shall be connected to the functional earth-terminal.

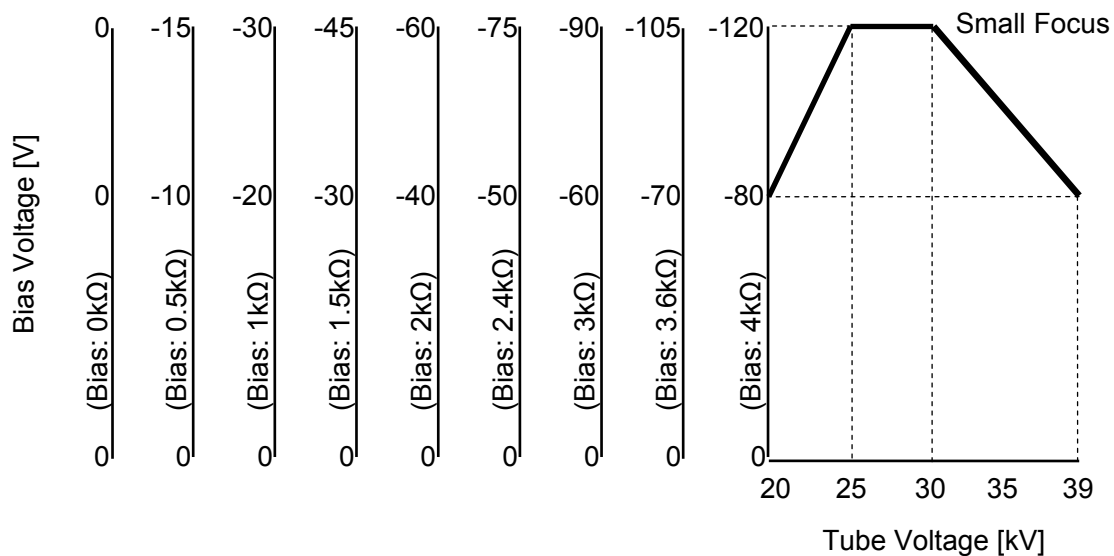
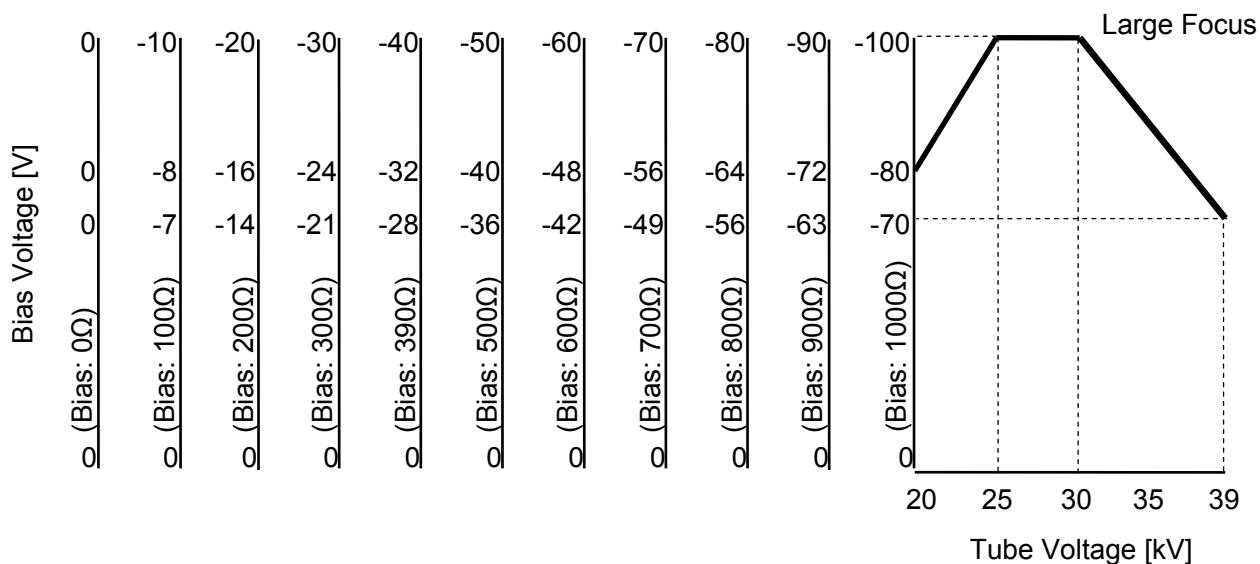
## Biassing Method (2) (With Bias-Voltage Supply)

[1] Circuit Diagram



## [2] Bias Voltage

\* ; Bias resistor is specified by the inspection sheet of each tube.

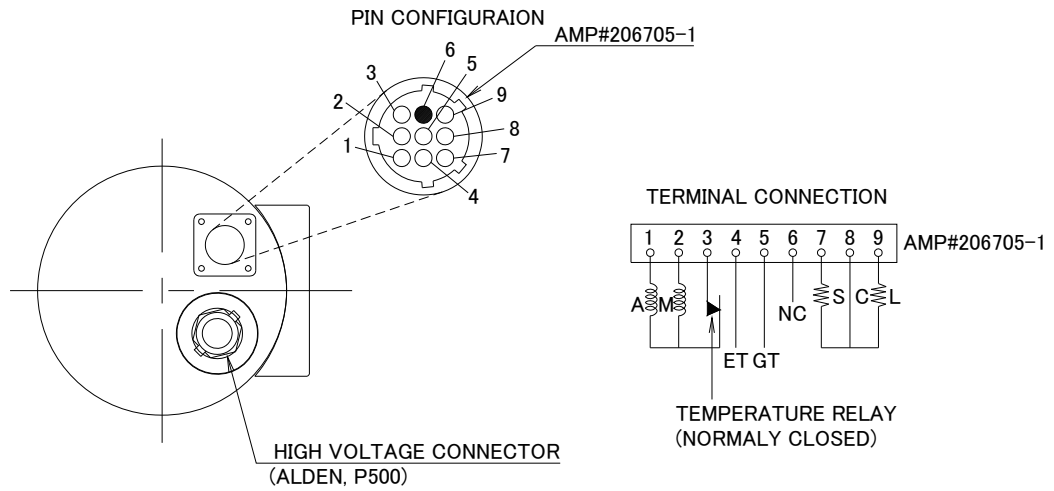
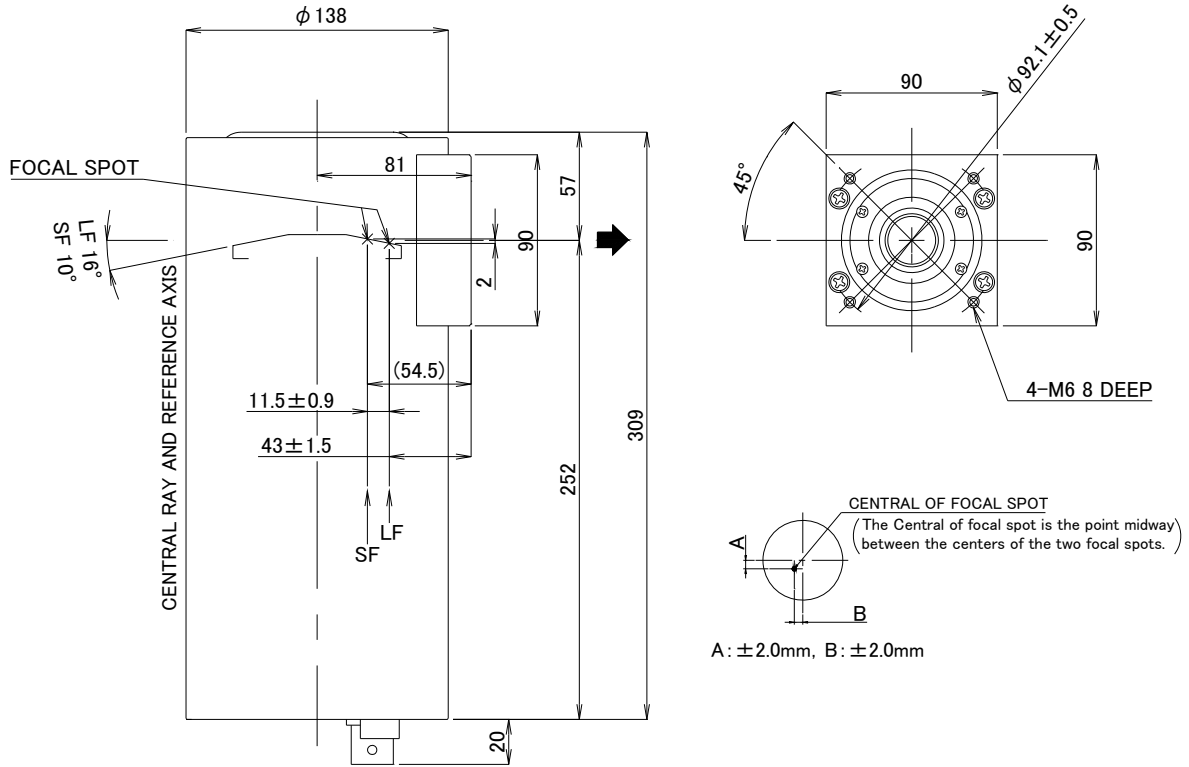


## [3] Bias Voltage Connection

- (1) The filament common-terminal (Terminal No.8) shall be connected to the earth terminal.
- (2) The grid-terminal (Terminal No.5) shall be connected to the minus(⊖) terminal of the bias-voltage supply.
- (3) The plus(⊕) terminal of the bias-voltage supply shall be connected to the earth terminal.

### Dimensional Outline

Unit: mm

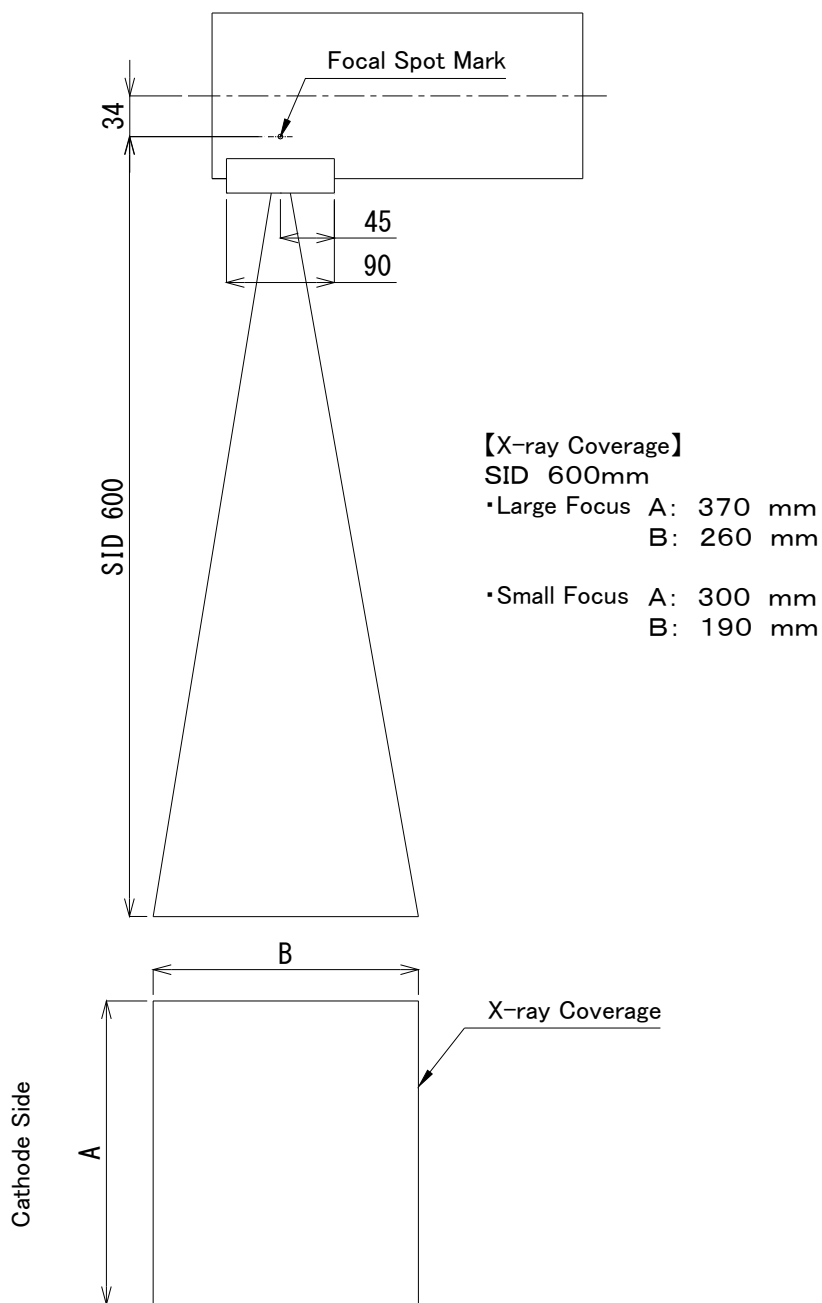


- C : COMMON  
(EARTH TERMINAL OF INSERT TUBE)
- L : LARGE FOCUS
- S : SMALL FOCUS
- M : MAIN WINDING OF THE STATOR COIL
- A : AUX. WINDING OF THE STATOR COIL

- GT : GRID TERMINAL
- ET : EARTH TERMINAL OF HOUSING ASS
- NT : NON-CONNECTION
- ▲ : CENTRAL X-RAY ANODE TERMINAL
- : ALDEN, P500 FOT

# X-ray Coverage

Unit: mm



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