TOSHIBA
Leading Innovation

Product Information *PI*

ROTANODE™
E7100X CE 0197

Rotating Anode X-ray Tube Assembly

- High speed rotating anode X-ray tube assembly for high energy radiographic operations.
- For the purpose of general diagnostic X-ray procedures.
- This tube has foci 1.2 and 0.6, and is available for a maximum tube voltage 150 kV.
- This tube housing assembly has specially processed rhenium-tungsten faced molybdenum target of 100 mm diameter anode disc and is accommodated with IEC60526 high-voltage cable receptacles.

General Data

IEC Classification (IEC60601-1:2005) ..... **Class Ⅰ ME EQUIPMENT**

Electrical:

Circuit:

High Voltage Generator ..... Constant Potential High-Voltage Generator

Grounding ..... Center-Grounded

Nominal X-ray Tube Voltage (IEC60613:2010):

Radiographic ..... 150 kV

Fluoroscopic ..... 125 kV

Nominal Focal Spot Value (IEC60336:2005):

Large Focus 1.2

Small Focus 0.6

Nominal Anode Input Power (at 0.1s) ..... See rating charts

	50 Hz	60 Hz	180 Hz
Large Focus	55.5 kW	59 kW	100 kW
Small Focus	21.5 kW	24 kW	40 kW

Nominal Radiographic Anode Input Power (IEC60613:2010):

	50 Hz	60 Hz	180 Hz
Large Focus	44 kW	48 kW	80 kW
Small Focus	17 kW	18 kW	30 kW

Motor Ratings:[1)]

Stator: XS-AG

		Starting		Running	
Driven Frequency	[Hz]	180	50/60	180	50/60
Input Power	[W]	3600	1500	200	100
Voltage [4) 6)]	[V]	370	170	95	50
Current [5)]	[A]	10.3	10.6	2.7	2.6
Min. Speed Up [2) 8)]	[s]	1.2	0.8	-	-
Capacitor	[μF]	6	44	6	44
Min. Braking [3) 8)]	[s]	3.0 (DC 80V)			

Note 1) To be obtained with TOSHIBA starter RS-200 or equivalent.
2) 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.
3) To be applied for high speed rotation.
4) Applied voltage between common and main terminal.
5) Common current.
6) The every applied voltage must be never exceeded 110% of the above specification.
7) No more than two high speed starts per minute are permissible.
8) The speed-up time is allowed up to 110% of the above specification.

Anode Speed:

50 Hz ..... Minimum 2700 min^{-1}

60 Hz ..... Minimum 3200 min^{-1}

180 Hz ..... Minimum 9700 min^{-1}

Stator Resistance:

Common-Main Winding ..... 9.4 Ω

Common-Auxiliary Winding ..... 28.3 Ω

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 ..... 496 mm

Maximum Diameter ..... 195 mm

Target:

Anode Angle ..... 12 degrees

Diameter ..... 100 mm

Construction ..... Rhenium-Tungsten faced Molybdenum

Permanent Filtration ..... 1.1 mm Al / 75 kV IEC60522:1999

Radiation Protection (In accordance with IEC60601-1-3:2008):

Leakage Technique Factor ..... 150 kV, 3.4 mA

X-ray Coverage ..... 430 × 430 mm at SID 1000 mm

Weight (Approx.) ..... 24 kg

High Voltage Receptacle ..... To meet the requirements of IEC60526 Corrigendum1:2010

Cooling Method ..... Natural or forced air

Tube Housing Model Number XH-112V

Absolute Maximum and Minimum Ratings
(At any time, these values must not be exceeded.)

Maximum X-ray Tube Voltage (IEC60613:2010):
- Radiographic ..... 150 kV
- Fluoroscopic ..... 125 kV

Between Anode (or Cathode) and Ground ..... 75 kV
Minimum X-ray Tube Voltage ..... 40 kV
Maximum X-ray Tube Current (IEC60613:2010):
- Large Focus ..... 1000 mA
- Small Focus ..... 500 mA

Maximum Filament Current:
- Large Focus ..... 5.8 A
- Small Focus ..... 5.2 A

Filament Voltage:
- Large Focus (At maximum filament current 5.8 A) ..... 12.8 ~ 17.2 V
- Small Focus (At maximum filament current 5.2 A) ..... 10.2 ~ 13.8 V

Filament Frequency Limits ..... 0 ~ 25 kHz
Continuous Anode Input Power (IEC60613:2010) ..... 240 W (335 HU/s)
(Fluoroscopic, repeated radiographic or mixed exposure)
Thermal Characteristics:
- Anode Heat Content ..... 210 kJ (300 kHU)
- Maximum Anode Heat Dissipation ..... 710 W (1000 HU/s)
- X-ray Tube Assembly Heat Content ..... 1070 kJ (1508 kHU)
- Nominal Continuous Input Power (IEC60613:2010):
  - Without Air-circulator ..... 215 W (18 kHU/min)

Environmental Limits

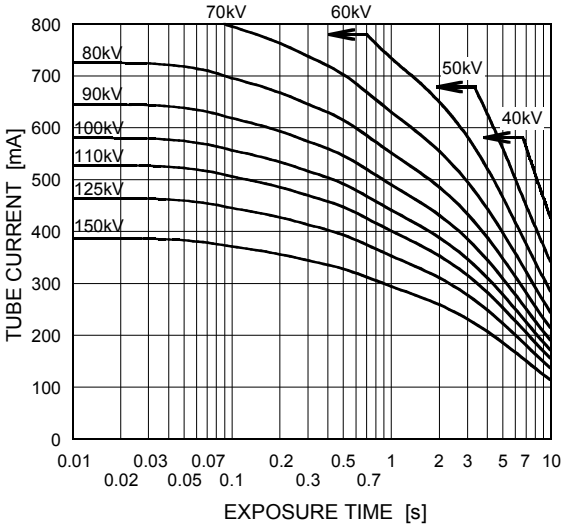
Operating Limits:
- Temperature ..... 10 ~ 40 °C
- Humidity ..... 30 ~ 85 %
  (No condensation)
- Atmospheric Pressure ..... 70 ~ 106 kPa

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

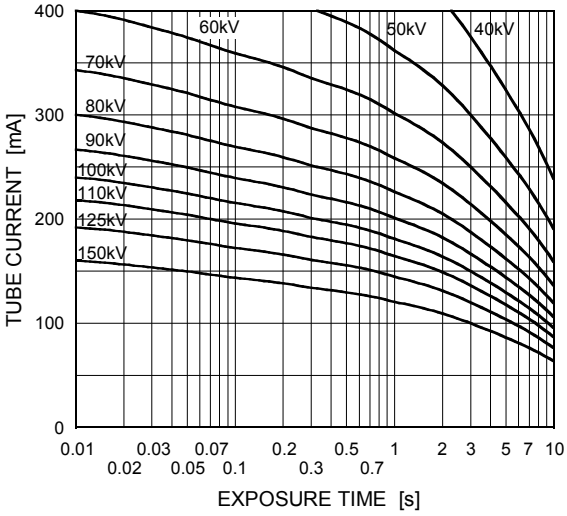
Maximum Rating Charts
(Absolute Maximum Rating Charts)

Conditions: Tube Voltage
Constant potential high-voltage generator
Stator Power Frequency 50Hz

Nominal Focal Spot Value: 1.2 ■



Nominal Focal Spot Value: 0.6 ▣

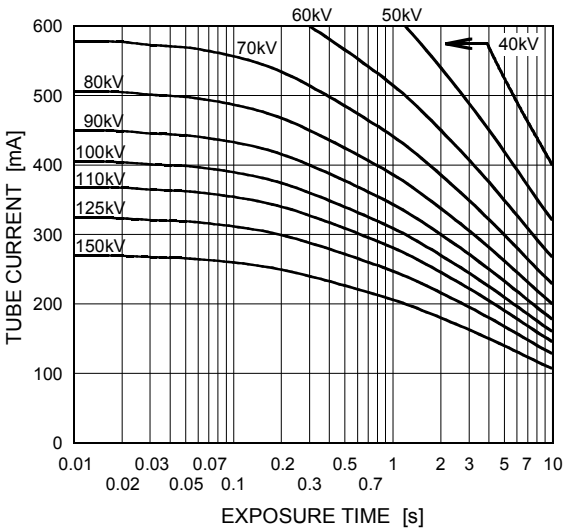


Refer to IEC60613:2010

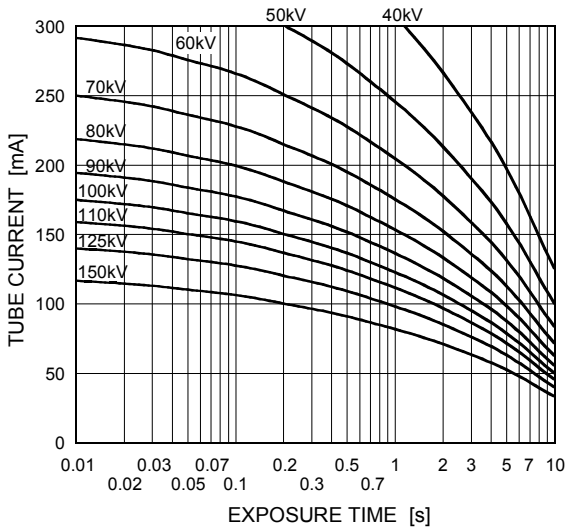
Maximum Rating Charts
(Spot-Film Rating Charts)

Conditions: Tube Voltage
Constant potential high-voltage generator
Stator Power Frequency 50Hz

Nominal Focal Spot Value: 1.2 ■



Nominal Focal Spot Value: 0.6 ▣

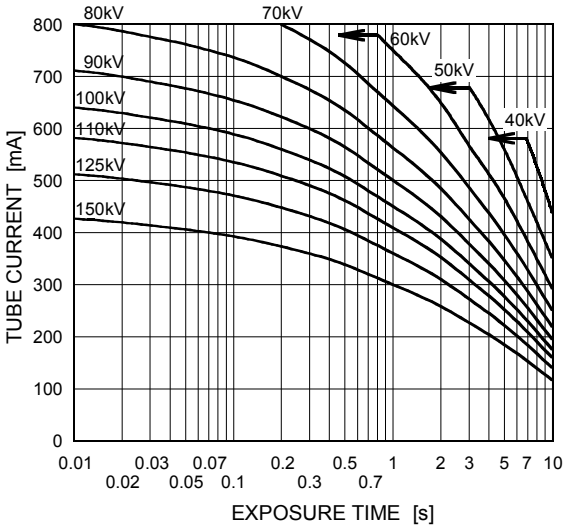


Refer to IEC60613:2010

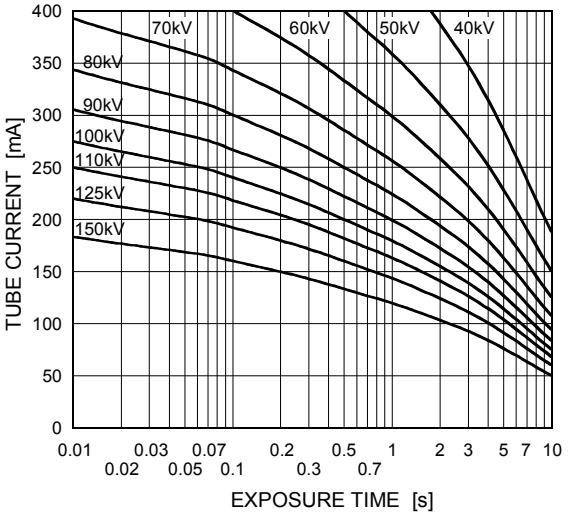
Maximum Rating Charts
(Absolute Maximum Rating Charts)

Conditions: Tube Voltage
Constant potential high-voltage generator
Stator Power Frequency 60Hz

Nominal Focal Spot Value: 1.2 ■



Nominal Focal Spot Value: 0.6 ▣

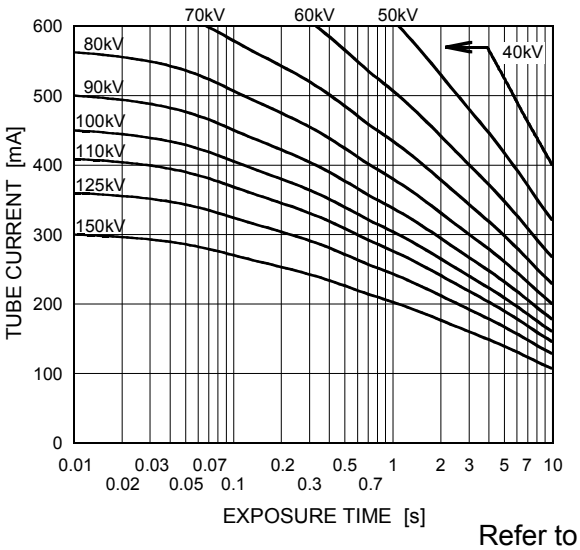


Refer to IEC60613:2010

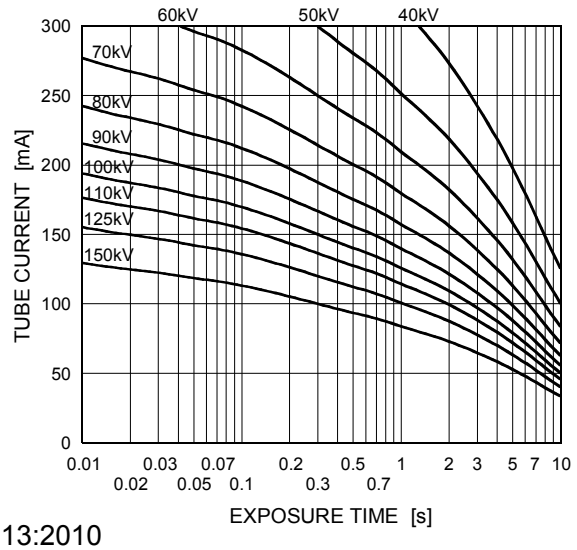
Maximum Rating Charts
(Spot-Film Rating Charts)

Conditions: Tube Voltage
Constant potential high-voltage generator
Stator Power Frequency 60Hz

Nominal Focal Spot Value: 1.2 ■



Nominal Focal Spot Value: 0.6 ▣

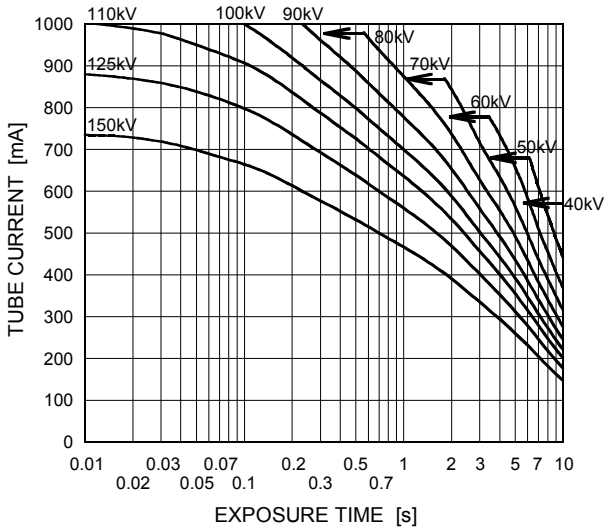


Refer to IEC60613:2010

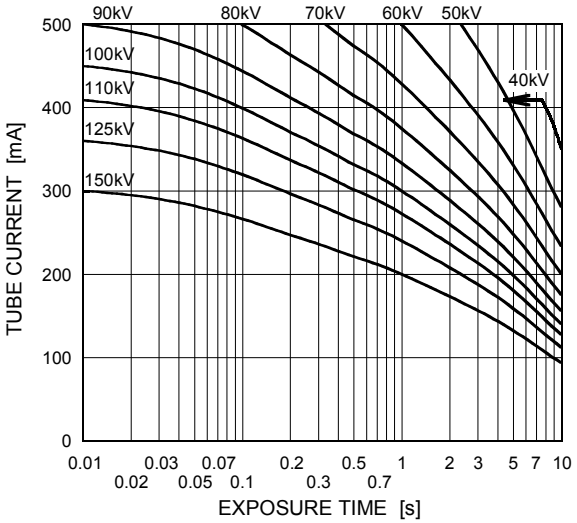
Maximum Rating Charts
(Absolute Maximum Rating Charts)

Conditions: Tube Voltage
Constant potential high-voltage generator
Stator Power Frequency 180Hz

Nominal Focal Spot Value: 1.2 ■



Nominal Focal Spot Value: 0.6 ▣

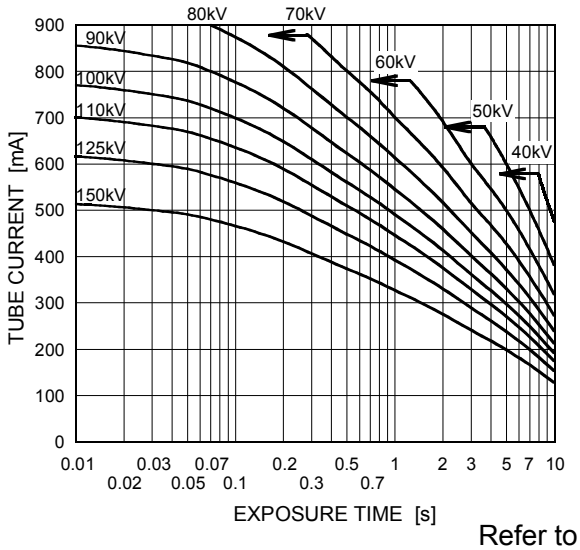


Refer to IEC60613:2010

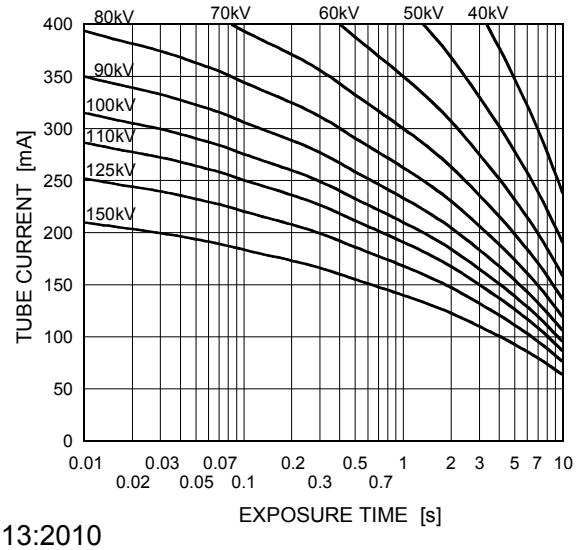
Maximum Rating Charts
(Spot-Film Rating Charts)

Conditions: Tube Voltage
Constant potential high-voltage generator
Stator Power Frequency 180Hz

Nominal Focal Spot Value: 1.2 ■



Nominal Focal Spot Value: 0.6 ▣

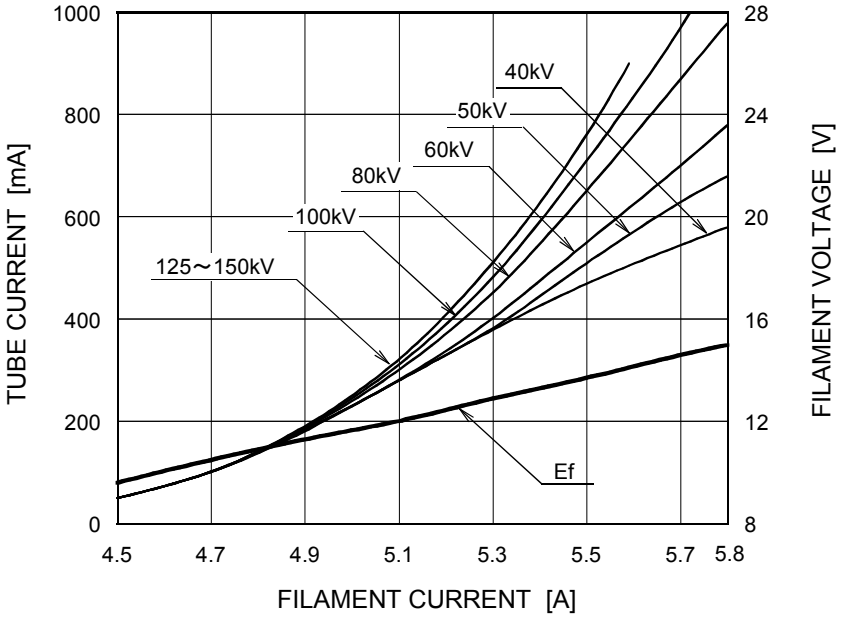


Refer to IEC60613:2010

Emission & Filament Characteristics

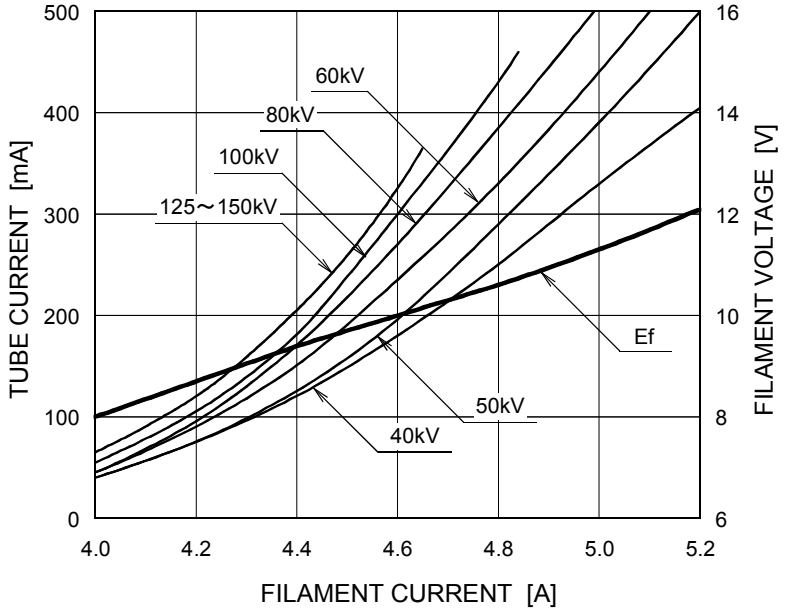
Constant potential high-voltage generator

Nominal Focal Spot Value: 1.2 ■



Note1) For Reference Only
Note2) Refer to IEC60613:2010

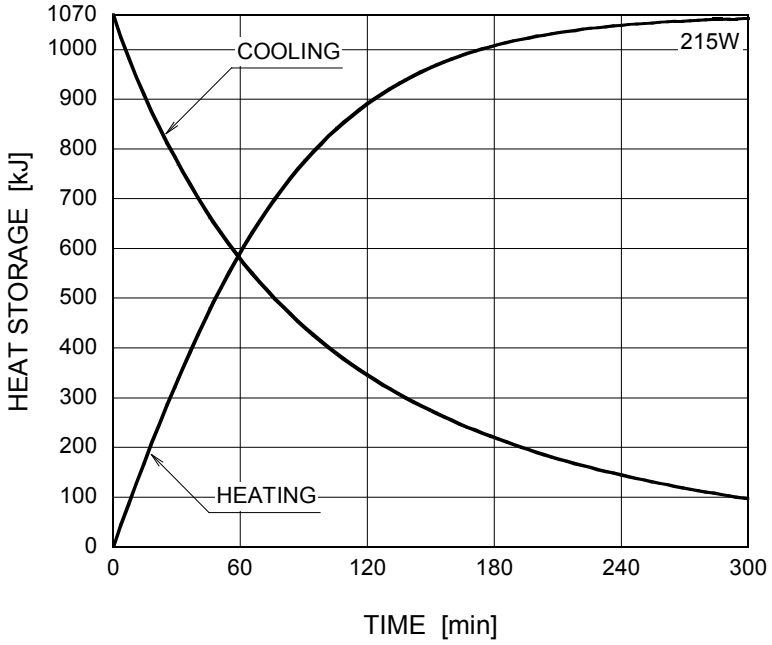
Nominal Focal Spot Value: 0.6 ▣



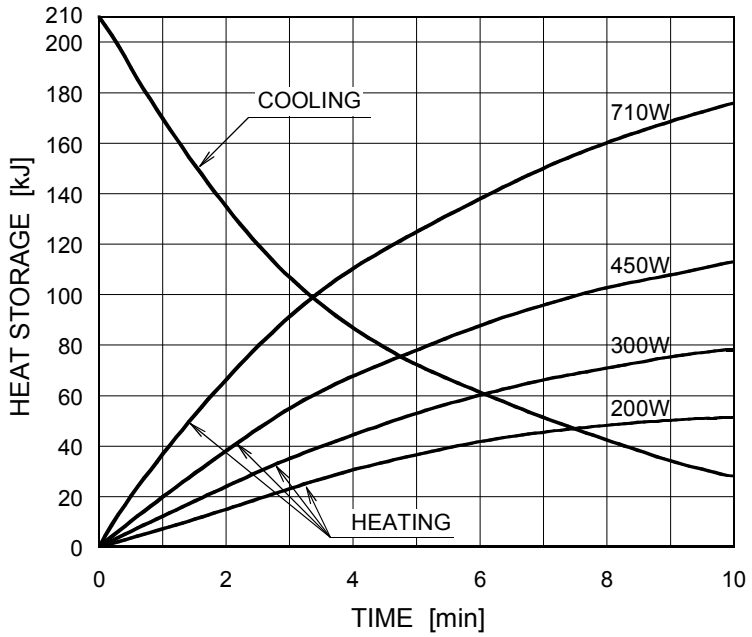
Note1) For Reference Only
Note2) Refer to IEC60613:2010

Thermal Characteristics

X-ray Tube Assembly Heating / Cooling Curve



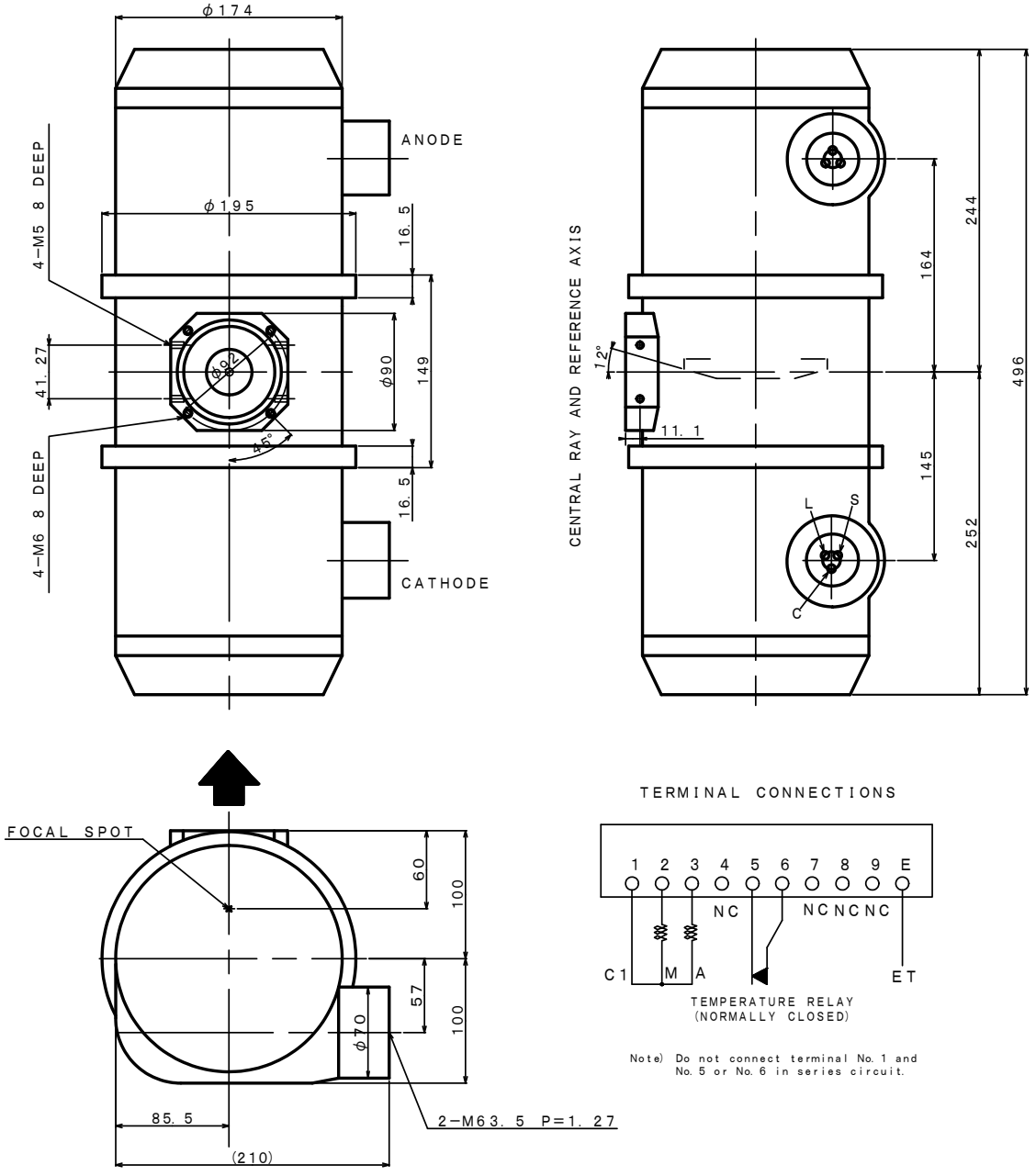
Anode Heating / Cooling Curve



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

Dimensional Outline

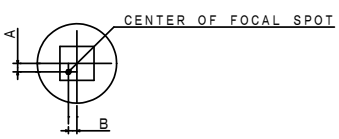
Unit: mm



TERMINAL CONNECTIONS

TEMPERATURE RELAY
(NORMALLY CLOSED)

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



−1.5mm≦A≦1.5mm
−1.5mm≦B≦1.5mm

EXPLANATION OF SYMBOLS

CATHODE TERMINAL
- C : COMMON
- L : LARGE FOCUS
- S : SMALL FOCUS

TERMINAL CONNECTIONS
- C1 : COMMON
- M : MAIN WINDING OF THE STATOR
- A : AUX. WINDING OF THE STATOR
- NC : NON-CONNECTION
- ET : EARTH TERMINAL

⬆ : CENTRAL X-RAY

ANODE & CATHODE TERMINAL
: IEC60526 TYPE

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