**ROTANODE™**
**XRR-4631G**

# 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 150kV.
- This tube assembly has specially processed rhenium-tungsten faced molybdenum target of 100mm diameter anode disc and is accommodated with IEC60526 high-voltage cable receptacles.

## General Data

**IEC Classification (IEC60601-1:2005+A1:2012) ..... Class Ⅰ ME EQUIPMENT**

### Electrical:

Circuit:

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

Grounding ..... Center-grounded

Nominal X-ray Tube Voltage:

Radiographic ..... 150 kV

Nominal Focal Spot Value:

Large Focus ..... 1.2

Small Focus ..... 0.6

Nominal Anode Input Power (at 0.1s):

| | 180 Hz | 60 Hz |
|---|---|---|
| Large Focus ..... | 100 kW | 58 kW |
| Small Focus ..... | 40 kW | 23 kW |

Nominal Radiographic Anode Input Power:

| | 180 Hz | 60 Hz |
|---|---|---|
| Large Focus ..... | 94 kW | 56 kW |
| Small Focus ..... | 36 kW | 23 kW |

Motor Ratings:

Stator: XS-BM

| | | Starting | | Running | |
|---|---|---|---|---|---|
| Driven Frequency | [Hz] | 180 | 60 | 180 | 60 |
| Input Power | [W] | 3600 | 1760 | 320 | 240 |
| Voltage [3) 7)] | [V] | 260 | 140 | 70 | 50 |
| Current [4)] | [A] | 15 | 13.5 | 5 | 5 |
| Min. Speed Up [1) 7)] | [s] | 1.3 | 1.3 | - | - |
| Capacitor | [μF] | 20 | 65 | 20 | 65 |
| Min. Braking [2) 7)] | [s] | 3.0 / 60V (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.
8) The generator manufacture may choose different values. The above table is one of the recommend conditions.

Anode Speed*:

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

60 Hz ..... Minimum 3120 $min^{-1}$

Stator Resistance:

Common-Main Winding ..... 6 Ω

Common-Auxiliary Winding ..... 11 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 ..... 445 mm
Maximum Diameter ..... 166 mm
Target:
Anode Angle ..... 12 degrees
Diameter ..... 100 mm
Construction ..... Rhenium-Tungsten-faced Molybdenum
Filtration:
Permanent Filtration ..... 1.1 mm AL / 75 kV IEC60522:1999
Available Additional Filter combination (0.4 - 1.5 mm) ..... Maximum 2.6 mm AL / 75 kV
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.) ..... 20 kg
High Voltage Receptacle ..... To meet the requirements of IEC60526 Corrigendum1:2010
Cooling Method ..... Natural or Forced Air
Tube Housing Model Number ..... XH-1019

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

Maximum X-ray Tube Voltage:
- Radiographic ..... 150 kV

Between Anode (or Cathode) and Ground ..... 75 kV
Minimum X-ray Tube Voltage ..... 40 kV
Maximum X-ray Tube Current ..... See Rating Charts
- Large Focus ..... 1000 mA
- Small Focus ..... 400 mA

Maximum Filament Current:
- Large Focus ..... 5.2 A
- Small Focus ..... 5.1 A

Filament Voltage:
- Large Focus (At Maximum Filament Current 5.2 A) ..... 11.3 ~ 15.4 V
- Small Focus (At Maximum Filament Current 5.1 A) ..... 5.9 ~ 8.1 V

Filament Frequency Limits ..... 0 ~ 25 kHz
Continuous Anode Input Power ..... 300 W (420 HU/s)
Thermal Characteristics:
- Anode Heat Content ..... 285 kJ (400 kHU)
- Maximum Anode Heat Dissipation ..... 1200 W (1690 HU/s)
- X-ray Tube Assembly Heat Content ..... 1480 kJ (2000 kHU)
- Nominal Continuous Input Power:
  - Without Air-circulator ..... 222 W (18 kHU/min)

## Environmental Limits

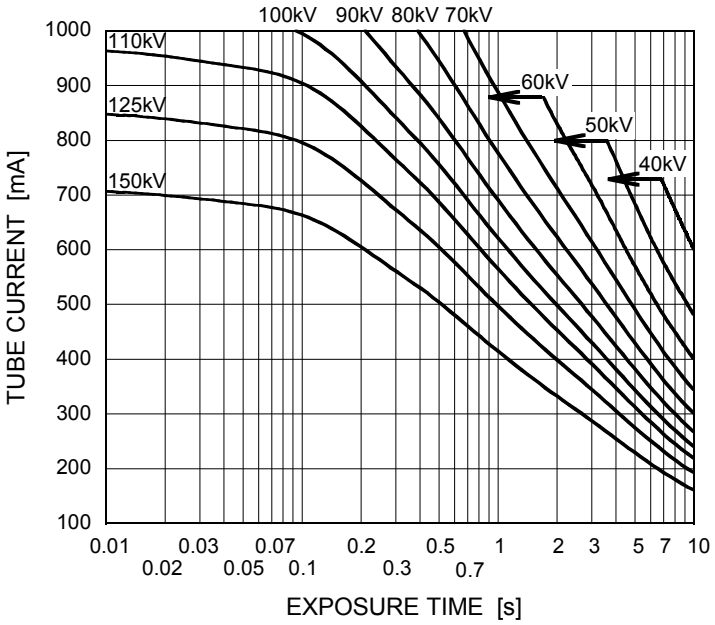
Operating Limits:
- Temperature ..... 10 ~ 40 °C
- Humidity ..... 30 ~ 85 % (No Condensation)
- Atmospheric Pressure ..... 70 ~ 106 kPa

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

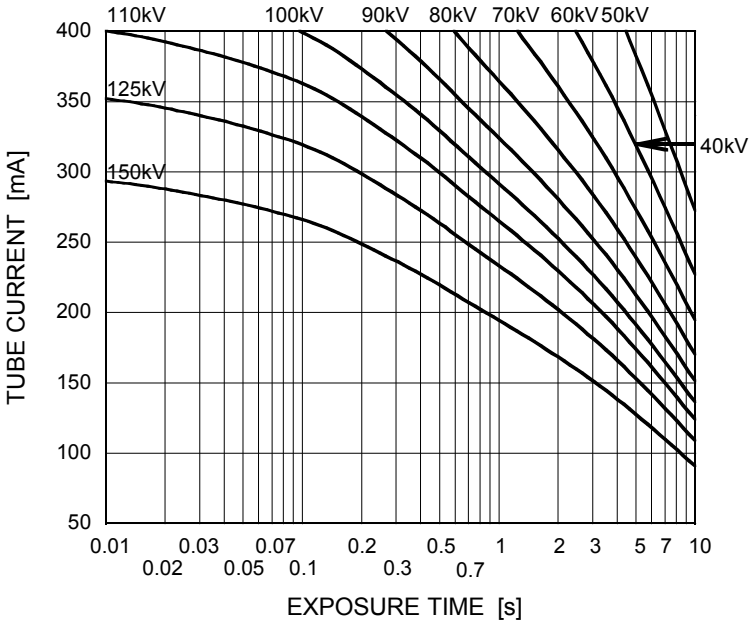
# Maximum Rating Charts
## (Absolute Maximum Rating Charts)

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

Nominal Focal Spot Value: 1.2 ■



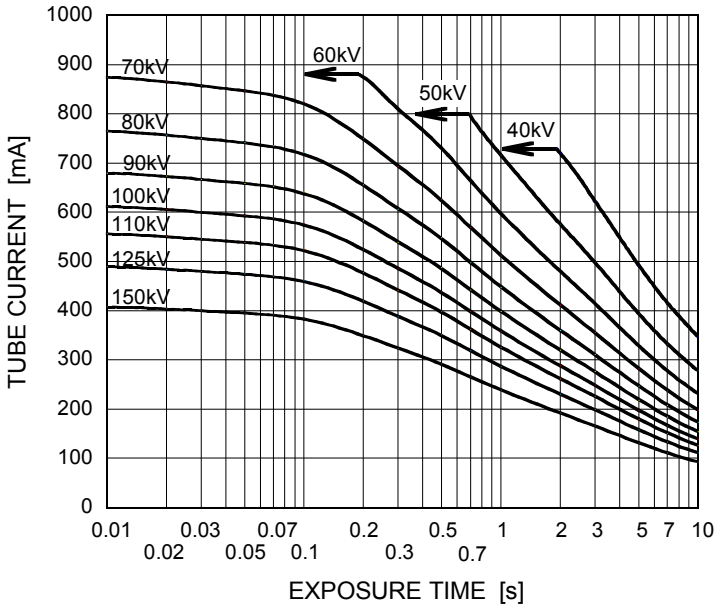

Nominal Focal Spot Value: 0.6 ▣



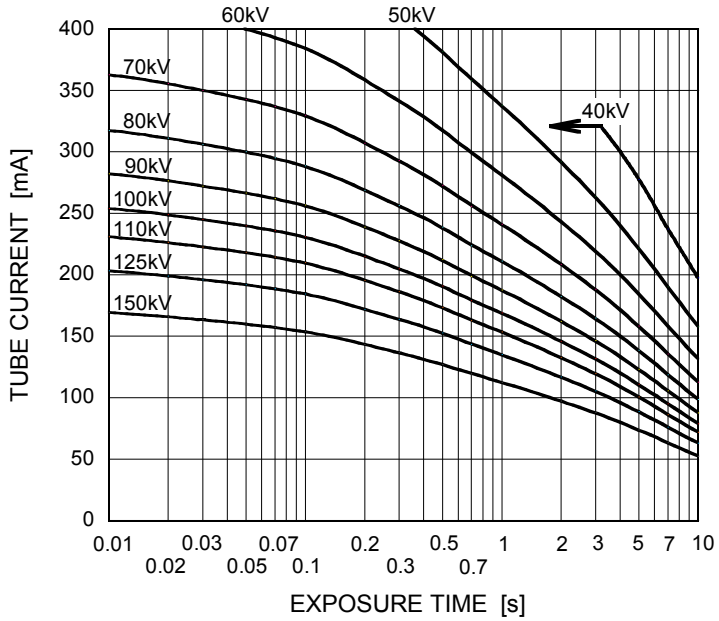
# Maximum Rating Charts
## (Absolute Maximum Rating Charts)

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

Nominal Focal Spot Value: 1.2 ■



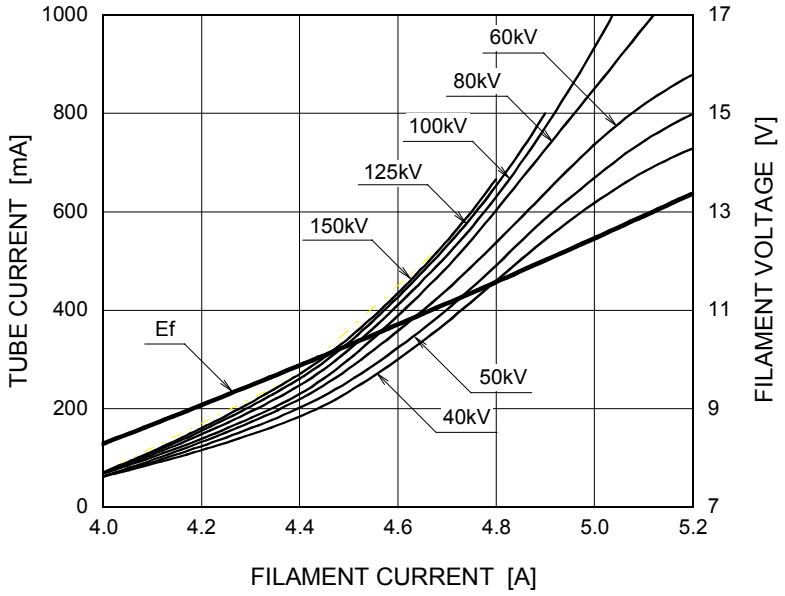

Nominal Focal Spot Value: 0.6 ▣



# Emission & Filament Characteristics

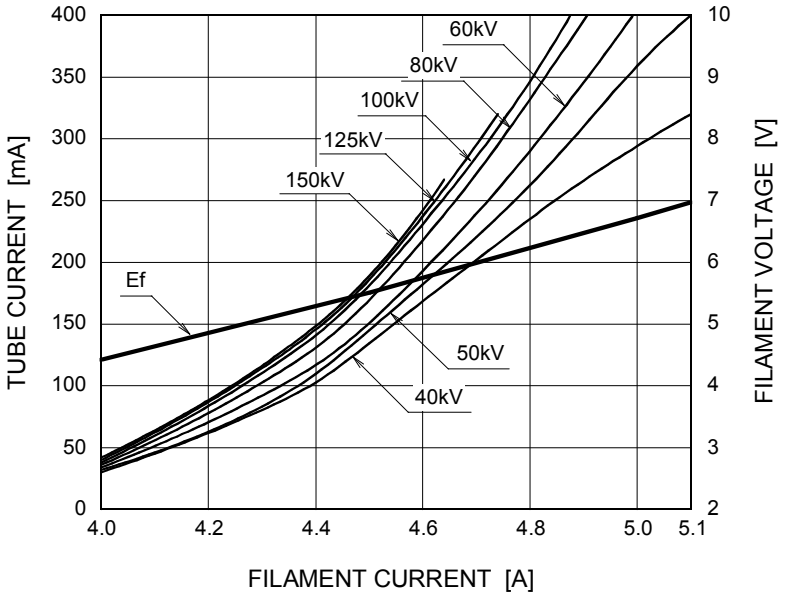
Constant Potential High-Voltage Generator

Nominal Focal Spot Value: 1.2 ■




For Reference Only

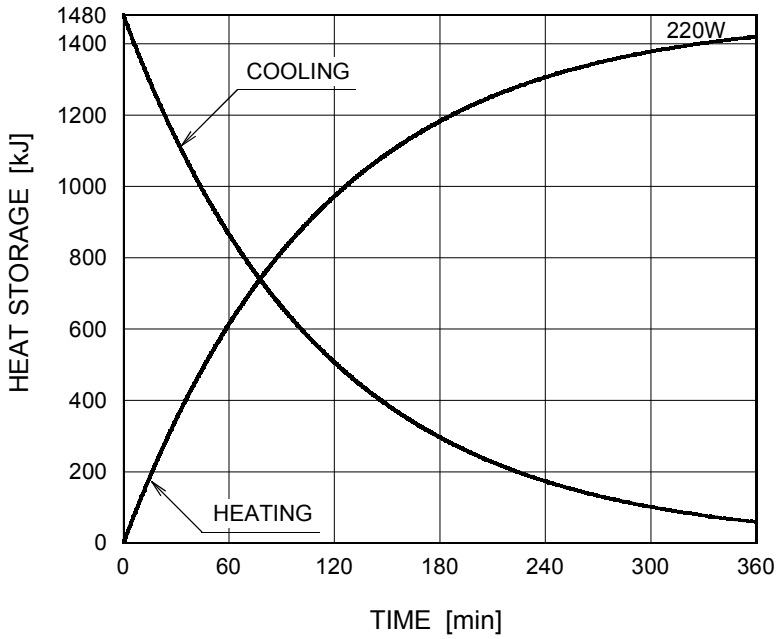
Nominal Focal Spot Value: 0.6 ▣



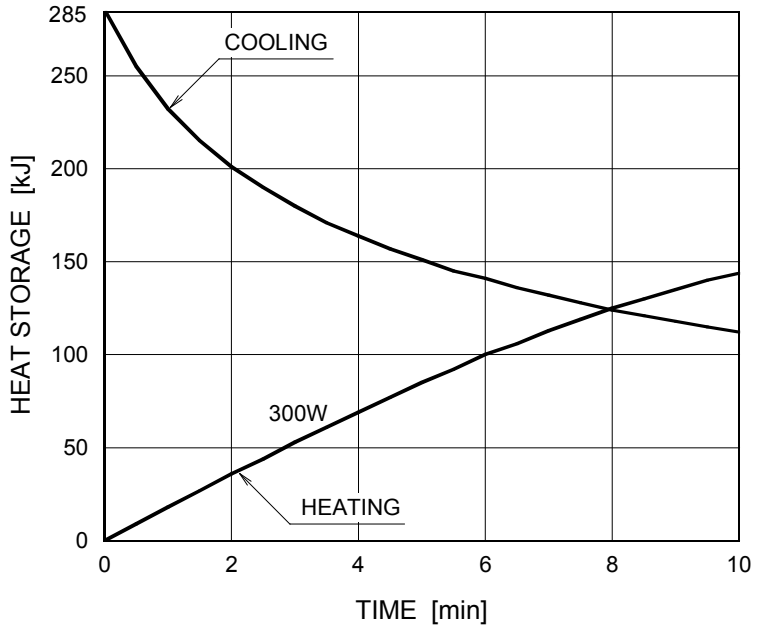

For Reference Only

# Thermal Characteristics

X-ray Tube Assembly Heating / Cooling Curve



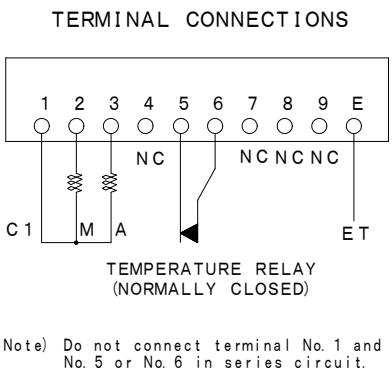

Anode Heating / Cooling Curve



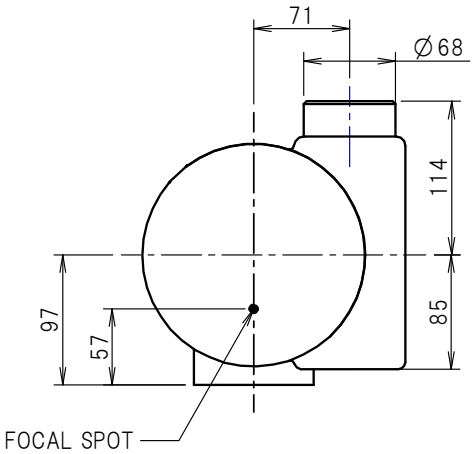

The heating curves are showing examples of average input power to the anode in operation.

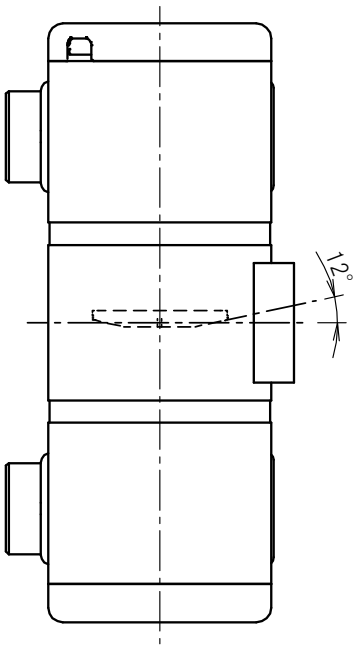
# Dimensional Outline

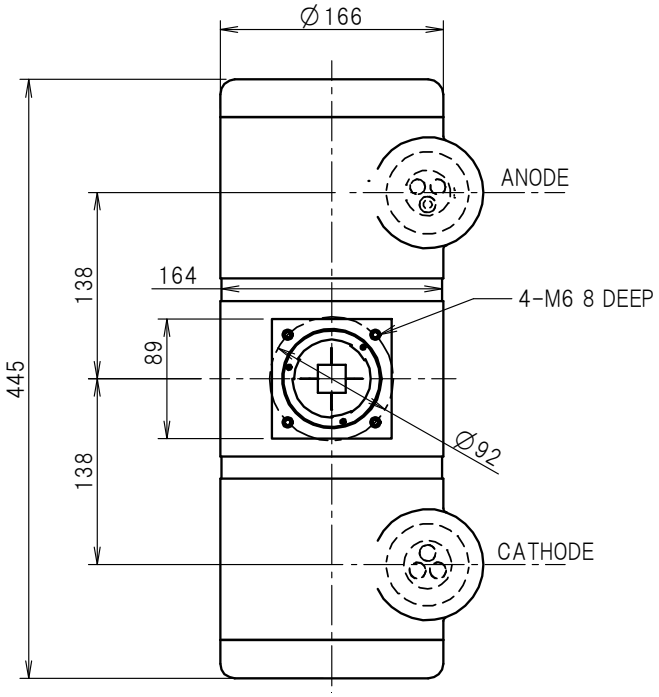
Unit mm




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



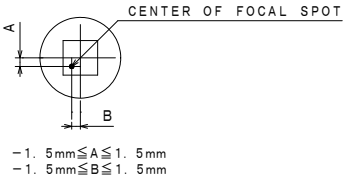

EXPLANATION OF SYMBOLS

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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