Rotating Anode X-ray Tube Assembly

- Rotating anode X-ray tube assembly for high energy radiographic operations.
- The heavy anode is constructed with specially processed rhenium-tungsten faced molybdenum target which is 74 mm diameter and has an improved coating to increase thermal emissivity.
- These tubes have foci 1.2 and 0.6, and are available for a maximum tube voltage 150 kV.
- Accommodated with IEC60526 type 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
Nominal Focal Spot Value (IEC60336:2005):
- Large Focus ........................................................................ 1.2
- Small Focus ........................................................................ 0.6
Nominal Anode Input Power (at 0.1s):
- Large Focus ........................................................................ 50 Hz 60 Hz 50 kW 54 kW
- Small Focus ........................................................................ 20 kW 22 kW
Nominal Radiographic Anode Input Power (IEC60613:2010):
- Large Focus ........................................................................ 50 Hz 60 Hz 42 kW 46 kW
- Small Focus ........................................................................ 16 kW 17 kW

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Motor Ratings:

<table>
<thead>
<tr>
<th></th>
<th>Starting</th>
<th>Running</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driven Frequency [Hz]</td>
<td>50/60</td>
<td>50/60</td>
</tr>
<tr>
<td>Input Power [W]</td>
<td>910</td>
<td>83</td>
</tr>
<tr>
<td>Voltage 1) 3) [V]</td>
<td>130</td>
<td>40</td>
</tr>
<tr>
<td>Current 2) [A]</td>
<td>7.8</td>
<td>2.3</td>
</tr>
<tr>
<td>Min. Speed Up 4) [s]</td>
<td>0.8</td>
<td>-</td>
</tr>
<tr>
<td>Capacitor [µF]</td>
<td>44</td>
<td>44</td>
</tr>
</tbody>
</table>

Note: 1) Applied voltage between common and main terminal.
2) Common current.
3) The every applied voltage must be never exceeded 110% of the above specification.
4) 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

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 479 mm
- Maximum Diameter 152.4 mm

Target:
- Anode Angle 12 degrees
- Diameter 74 mm
- Construction Rhenium-Tungsten faced Molybdenum

Filtration:
- Permanent Filtration 0.9 mm Al / 75 kV IEC60522:1999
- Available Additional Filter combination (0.4 - 1.5 mm) Maximum 2.4 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.) 16 kg
- High Voltage Receptacle To meet requirements of IEC60526 Corrigendum1:2010

Cooling Method Natural or forced air

Tube Housing Model Number:
- E7884X XH-121
- E7884FX XH-126
- E7884GX XH-150
**Absolute Maximum and Minimum Ratings**
*(At any time, these values must not be exceeded.)*

Maximum X-ray Tube Voltage (IEC60613:2010):
- Radiographic: 150 kV
- Between Anode (or Cathode) and Ground: 75 kV

Minimum X-ray Tube Voltage: 40 kV

Maximum X-ray Tube Current (IEC60613:2010): See rating charts
- Large Focus: 700 mA
- Small Focus: 300 mA

Maximum Filament Current:
- Large Focus: 5.4 A
- Small Focus: 5.2 A

Filament Voltage:
- Large Focus (At maximum filament current 5.4 A): 11.9 ~ 16.1 V
- Small Focus (At maximum filament current 5.2 A): 6.8 ~ 9.2 V

Filament Frequency Limits: 0 ~ 25 kHz

Continuous Anode Input Power (IEC60613:2010): 142 W (200 HU/s)
*(Fluoroscopic, repeated radiographic or mixed exposure)*

Thermal Characteristics:
- Anode Heat Content: 210 kJ (300 kHU)
- Maximum Anode Heat Dissipation: 870 W (1226 HU/s)
- X-ray Tube Assembly Heat Content: 900 kJ (1250 kHU)

Nominal Continuous Input Power (IEC60613:2010):
- Without Air-circulator: 180 W (15 kHU/min)

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**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 50 Hz

Nominal Focal Spot Value: 1.2

Refer to IEC60613:2010

Nominal Focal Spot Value: 0.6

Refer to IEC60613:2010

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

Nominal Focal Spot Value: 1.2

Refer to IEC60613:2010

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
The heating curves are showing example of average input power to anode in operation.
**Dimensional Outline of E7884X**

Unit: mm

**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

**CENTER OF FOCAL SPOT**

- \(-1.5\text{mm} \leq A \leq 1.5\text{mm}\)
- \(-1.5\text{mm} \leq B \leq 1.5\text{mm}\)

**TEMPERATURE RELAY** (NORMALLY CLOSED)

Note: Do not connect terminal No.1 and No.5 or 6 in series circuit.
Dimensional Outline of E7884FX

Unit: mm

Note) Do not connect terminal No.1 and No.5 or 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 RAY AND REFERENCE AXIS

-1.5mm ≦ A ≦ 1.5mm
-1.5mm ≦ B ≦ 1.5mm

CENTRAL X-RAY ANODE & CATHODE TERMINAL
IEC60526 TYPE
Dimensional Outline of E7884GX

Unit: mm

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

ANODE & CATHODE TERMINAL
IEC60526 TYPE

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