

SHIMADZU

0.7U163CS-36

X-Ray Tube

Installation - Operation
Calibration - Technical Data

A series of thin, dark, intersecting lines forming a complex web-like pattern across the lower half of the page. The lines are straight and vary in orientation, creating a series of triangles and other geometric shapes.

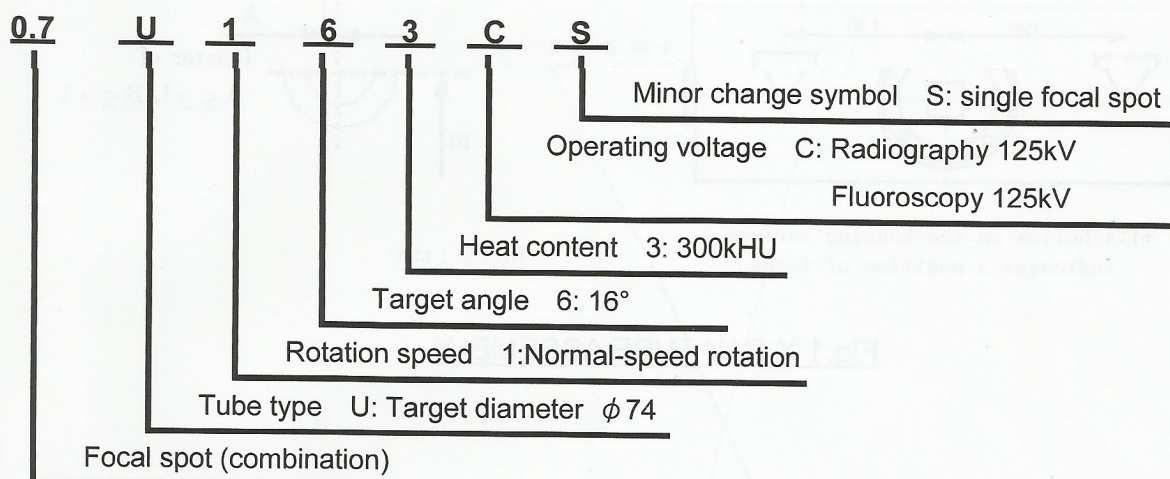
Shimadzu Housing X-Ray tube Designation

TUBE HOUSING ASSEMBLY TYPE	0.7/1.3U163C-36		
TUBE HOUSING ASSEMBLY SERIAL NO.	RM74B5966042	MAX.	133kV
INSERT TYPE	0.7/1.3U163C		
INSERT SERIAL NO.	61630		
FOCUS	0.7/1.3 mm		
PERMANENT FILTRATION	2.0Al/75		
MANUFACTURED	JUNE	2016	KYOTO
MANUFACTURED BY SHIMADZU CORPORATION <small>1 Nishinokyo-Kuwabarachou, Nakagyo-ku, Kyoto 604-8511, Japan</small>			

Dual focal Spot

TUBE HOUSING ASSEMBLY TYPE	0.7U163CS -36		
TUBE HOUSING ASSEMBLY SERIAL NO.	53318	MAX.	125kV
INSERT TYPE	0.7U163CS		
INSERT SERIAL NO.	53318		
FOCUS	0.7 mm		
PERMANENT FILTRATION	1.5mmAl at 70kV		
MANUFACTURED	JUNE	2005	KYOTO
MANUFACTURED BY SHIMADZU CORPORATION <small>1 Nishinokyo-Kuwabarachou, Nakagyo-ku, Kyoto 604-8511, Japan</small>			

Single focal Spot



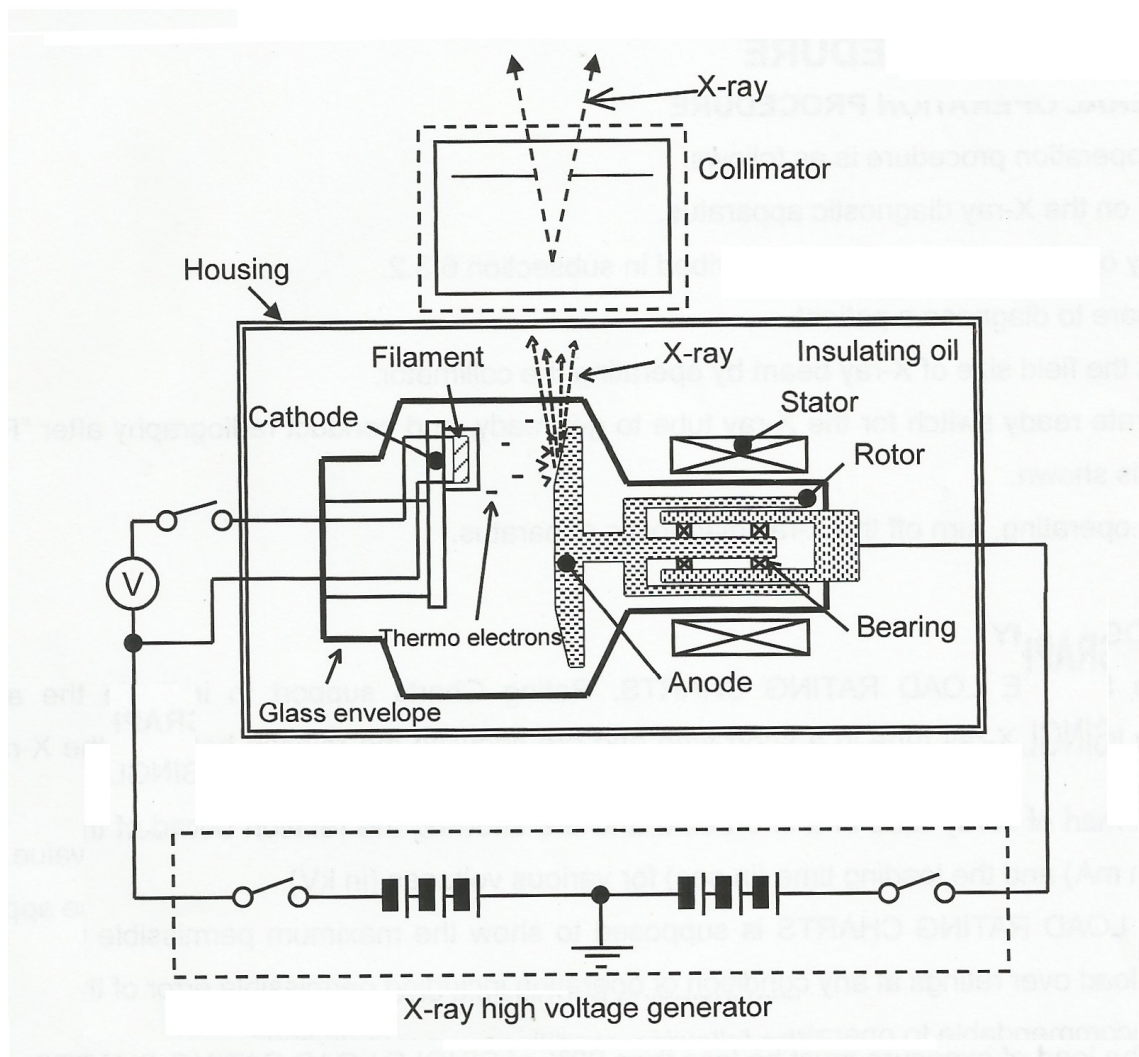
SHIMADZU

0.7U1636C Technical Data

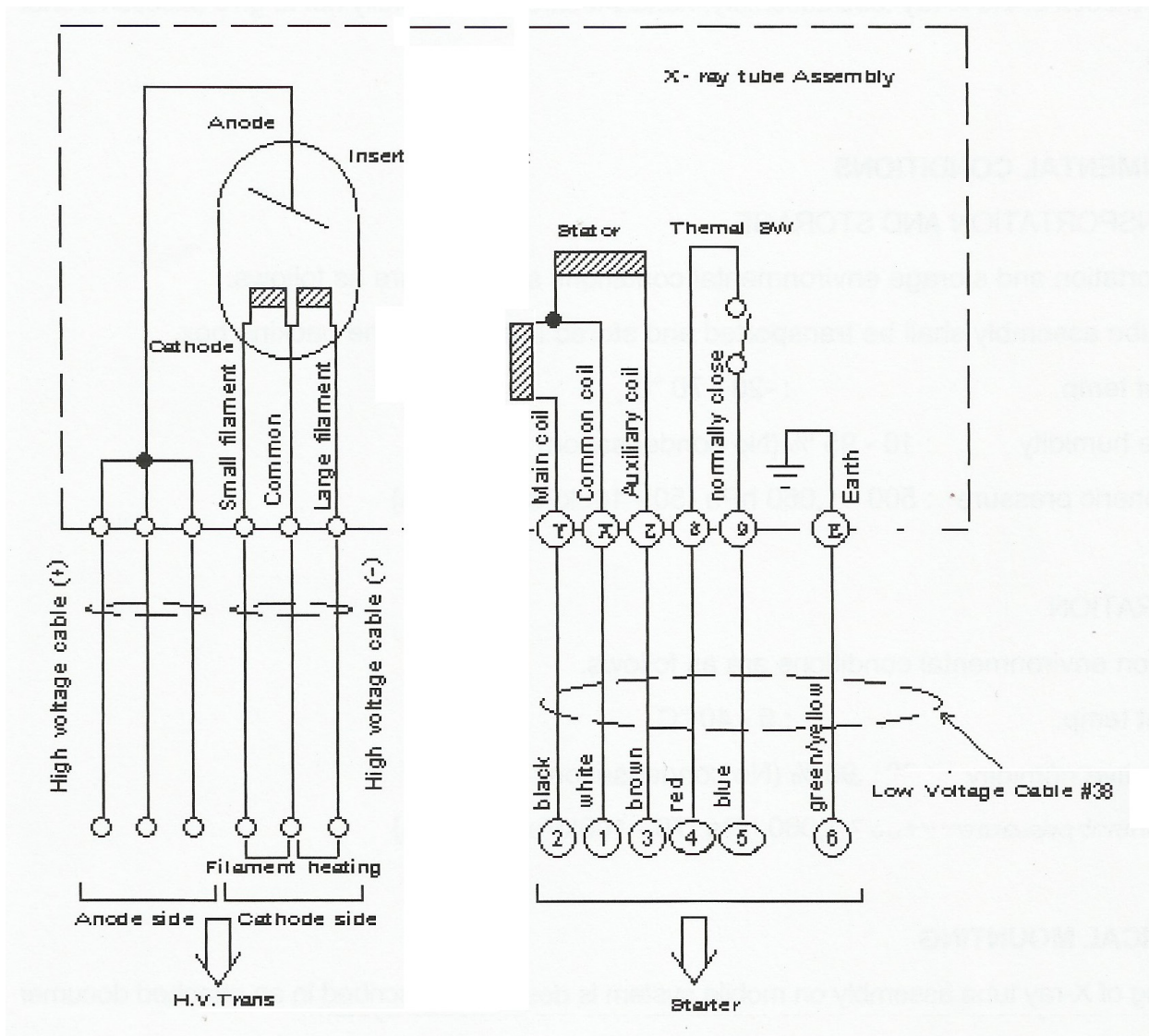
Items		Rated value
Nominal X-ray tube Voltage IEC 60613:2010	Radiography	125 kV
	Fluoroscopy	125 kV
X-ray tube Assembly	Max. heat content	750 kJ {1,060 kHU}
	Nominal continuous input power IEC 60613:2010	120 W { 170 HU/s}
X-ray Tube	Max. anode heat content	210kJ { 300kHU}
	Max. anode heat dissipation rate	800W {1,130HU/s}
	Max. continuous heat dissipation rate	210W { 300HU/s}*6
	Continuous anode input power IEC 60613:2010	100W (Repetition of radiographic exposure)
Nominal focal spot value IEC 60336		0.7
Measuring method of focal spot size		Slit camera
Nominal anode input power (0.1sec)		15.6kW(60Hz), 14.4kW(50Hz)
Nominal radiographic anode input power IEC 60613:2010		15.6kW(60Hz), 14.4kW(50Hz)
Max. filament voltage		15.0 V
Max. filament current *1		5.6 A
Anode target	Material	Rhenium-tungsten faced molybdenum
	Angle/diameter	16°/ 74mm
Anode rotation *2		Direction of anode rotation is counter-clockwise as viewed from the cathode side, and R.P.M as follows. 3200 min. ⁻¹ {R.P.M.} at 60 Hz 2700 min. ⁻¹ {R.P.M.} at 50 Hz
Minimum total filtration IEC 60601-2-28:2010		2.0 mm Al/75 kV (Including added filter*3)
Permanent filtration*4	IEC 60601-2-28:2010	2.0mm Al/ 75kV IEC 60522:1999
	JIS Z 4751-2-28:2008 (IEC 60601-2-28:1993)	Min. 1.5 mm Al at 70kV*5 (Including added filter)
Leakage radiation *7 IEC 60601-1-3:2008		Leakage radiation in hour from the X-ray tube assembly and collimator is less than 0.87 mGy at a distance of 1 meter from the focal spot. However, leakage radiation in an hour from the collimator is less than 0.30mGy.
X-ray radiation field		350mm × 350mm (at distance of 650mm from focal spot)
IEC classification IEC 60601-1:2005		CLASS I
Mass		12.8 kg
High voltage connector		CLAYMOUNT Corp. MINI-75 type

Operating principles of Rotating Anode X-Ray tube

- (a) The filament is pre heated by passing electrical current, emitting thermo electrons.
- (b) The anode is rotated by electromagnetic induction from a series wound stator.
- (c) A high voltage is applied between the cathode and anode to accelerate the electrons.
- (d) The accelerated electrons strike the anode target and x-rays are generated.
- (e) The field side of the x-ray beams are adjusted by the collimator.
- (f) The high voltage (KV), milliamps (MA) and time duration (S) of exposures are adjusted by the operator and the operating computer in the Shimadzu mobile unit.



CABLE CONNECTION DIAGRAM



Resistance of stator coils

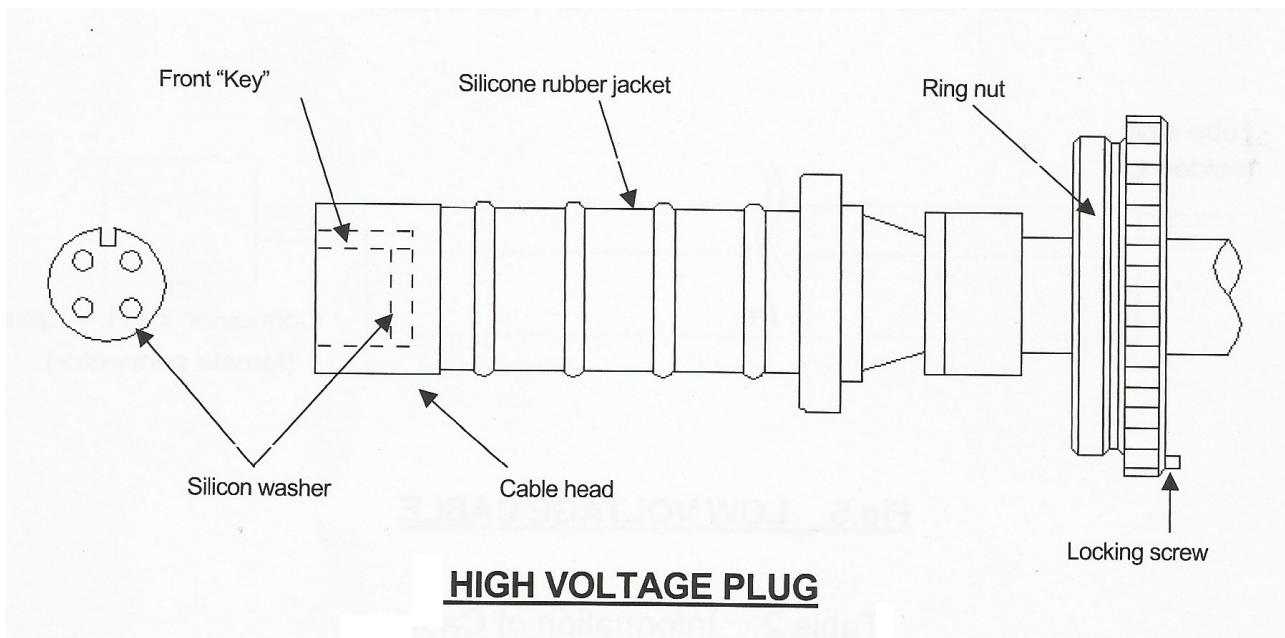
X-Z resistance : 13.0 ± 0.7 ohms

X-Z resistance : 46.0 ± 2.3 ohms

Z-Y resistance : 61.0 ± 5.0 ohms

HIGH VOLTAGE CABLE CONNECTION

- (a) Turn off power switch.
- (b) Check the surface of the power cable heads and sockets for debris.
- (c) Apply thin film of insulating grease to surface of silicone rubber jacket.
- (d) Confirm that “Silicone Washers” are attached to the front end of plugs (refer to Figure). Put cable heads aligned with sockets slotted key.
- (e) Tighten the Ring nuts by hand.
- (f) Screw in locking screws on locking rings.



General Installation - Operations Procedures

Every Shimadzu X-Ray tube will produce different exposure settings when installed on a different Shimadzu mobile diagnostic apparatus. Recalibration of the exposure settings will be required before normal operations can continue.

The standard adjustment method used by the Shimadzu mobile units are made in the (Two Point Adjustment Mode). Details of the Shimadzu Calibration method is available on the Ray-Pac website.

After calibration it is recommended by Shimadzu that an initial seasoning (aging or warming) must be carried out. Before daily operation it is recommended that daily seasoning must be carried out. It is common that a new or cold Shimadzu X-ray tube will create an F14 error code. As stated in the Shimadzu manual, further seasoning will solve this problem. The recommended seasoning procedures are shown below.

Initial Seasoning

- ① 80kV,0.1sec ----- 1 exposure
- ② 90kV,0.1sec ----- 1 exposure
- ③ 100kV,0.1sec ----- 1 exposure
- ④ 110kV,0.1sec ----- 2 exposures
- ⑤ 115kV,0.1sec ----- 2 exposures
- ⑥ 120kV,0.1sec ----- 2 exposures
- ⑦ 125kV,0.1sec ----- 2 exposures

Daily Seasoning

- ① 80kV,0.1sec ----- 1 exposure
- ② 90kV,0.1sec ----- 1 exposure
- ③ 100kV,0.1sec ----- 1 exposure
- ④ 110kV,0.1sec ----- 1 exposure
- ⑤ 115kV,0.1sec ----- 1 exposure
- ⑥ 120kV,0.1sec ----- 1 exposure
- ⑦ 125kV,0.1sec ----- 1 exposure

Radiation Leakage and Filters

- *3 Added filter
Added filter (1.2mm thickness Al filter, Min. 1.1mmAl equivalent considering the tolerance of thickness) is inserted in X-ray port. It can not be removed even with a tool.
- *4 Inherent filtration of X-ray tube is min. 0.7 mm Al.
- *5 This value is including the added filter. Total filtration is stated as permanent filtration according to JIS Z 4751-2-28:2008 which is the IDT standard to IEC 60601-2-28:1993.
- *6 Its value is limited by 120W in case of combination with housing RX-36.
- *7 Leakage radiation dose measuring condition
(1)125kV, 160W continuous
Actual leakage radiation dose measuring condition:125kV 125W continuous
Maximum leakage radiation dose measuring condition:125kV 160W continuous
Maximum leakage radiation value is calculated as follows.
(Maximum leakage radiation value)
= (160W/125W) × (Measured leakage radiation on actual condition)
= 1.28 × (Measured leakage radiation on actual condition)
(2)0.87mGy = 2.58×10^{-5} C/kg = 100mR

HIGH VOLTAGE GENERATOR

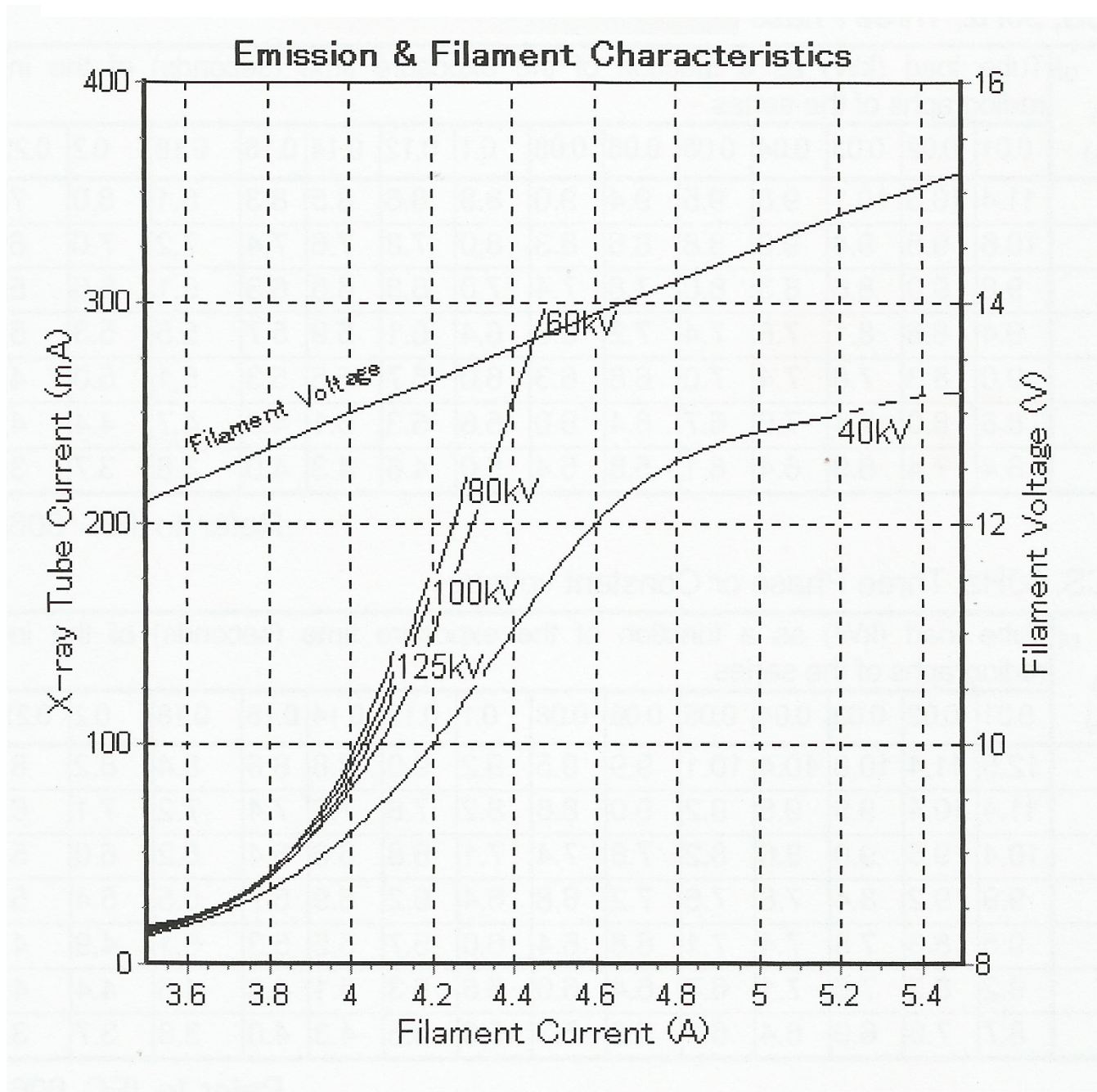
This apparatus is recommended to be used in combination with Shimadzu's mobile radiography system MUX-100 series, MUX-100H series and MUX-100D series.

STATOR INPUT POWER

		Boost	Run
Frequency	Hz	50/60	
Voltage	V	240	240
Time	sec	1.6	1(interval 10sec)
Phase shift capacitor	μF	25	
NOTE The recommended frequency of input power to the stator is less than once a minute.			

CATHODE EMISSIONS

FILAMENT CHARACTERISTICS



FIELD RADIATION

- (a) Lead Diaphragm is mounted in X-ray port to limit X-ray field. Remodeling of its hole or changing to another hole cause lack of radiation field or increase of leakage radiation. Don't exchange the part that Shimadzu doesn't designate. Refer to the Fig.6.

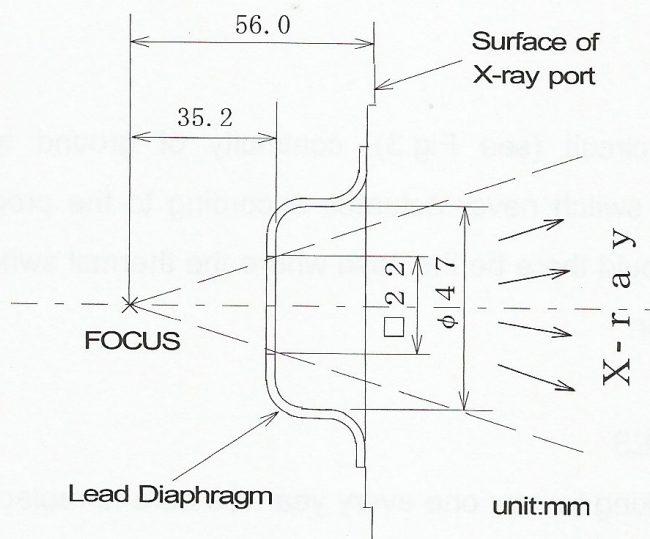


Fig.6. LEAD DIAPHRAGM

- (b) Specified radiation field is shown in Fig.7. The combined collimator (beam limiting device) limits the radiation field in some case. Use the collimator (normally R-20C) that Shimadzu designates or recommends.

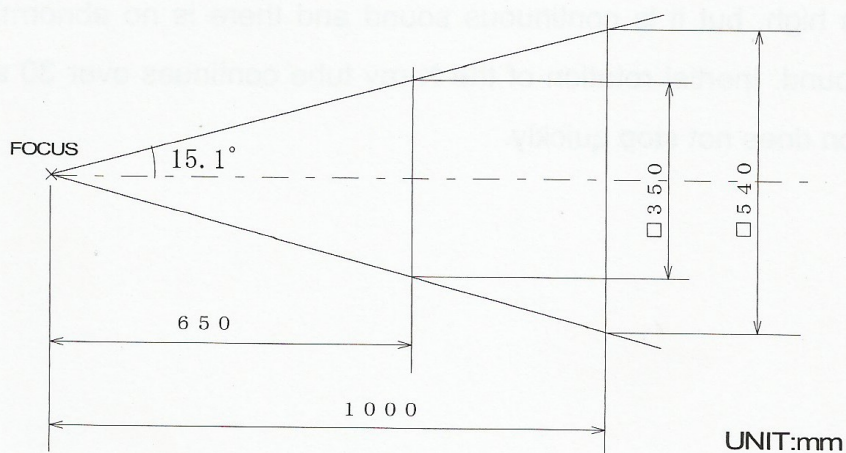
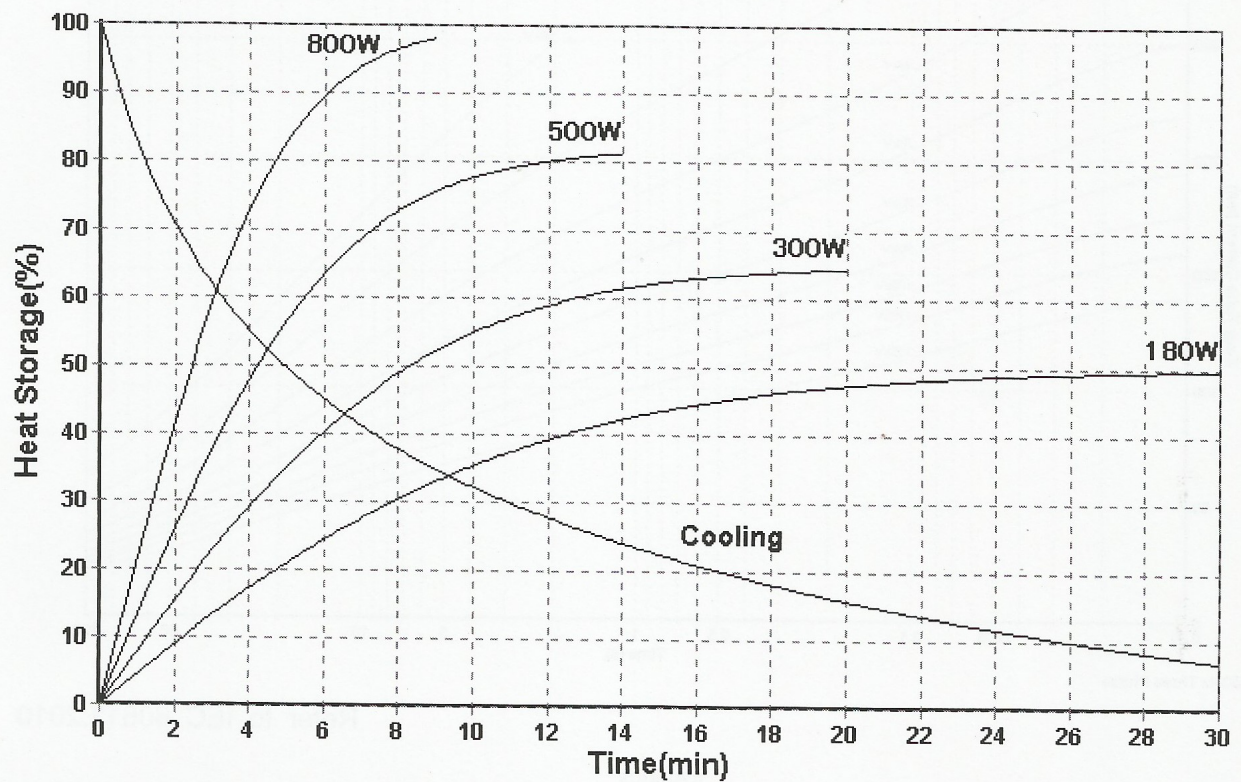


Fig.7. RADIATION FIELD

ANODE HEATING AND COOLING CURVE



X-RAY TUBE ASSEMBLY HEATING AND COOLING CURVE

