Manual No. : M535-E325
Revision : E

INSTALLATION MANUAL
X-RAY TUBE ASSEMBLY
0.7/1.2JG326D-265

This manual is for professional service engineers.
It bears no direct relation to the daily usage.

SHIMADZU

WARNING

When installing, operating, and servicing the equipment, follow the instructions given in the manuals. Safety is achieved by awareness of each worker.

In order to secure safety of the worker and persons around the equipment, follow the safety work standards.

It is dangerous to make internal repairs of equipment. Our qualified engineers will take care of it.

NOTE

The precautions and prohibitions seen through the manual are classified as follows:

DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in serious injury or death.
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in moderate to serious injury or possibly death.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor to moderate injury equipment damage.
NOTE	Emphasizes additional information that is provided to ensure the proper user of this product.

This manual is originally drafted and approved and supplied in English by the manufacturer.

Revision history

Rev.	Description	Date
C	Comply with RoHS. Add Revision history.	2013-10
D	Revise section 3.3 and chapter 5.	2019-05
E	Revise section 1.1 and chapter 12.	2019-07

CONTENTS

This page is intentionally left blank.

1 COMPONENTS

1.1 DETAILS OF COMPONENTS

This X-ray tube assembly 0.7/1.2JG326D-265 has two variations shown in Table1.

The difference of two types is combined heat exchanger.

Table1 COMPONENTS

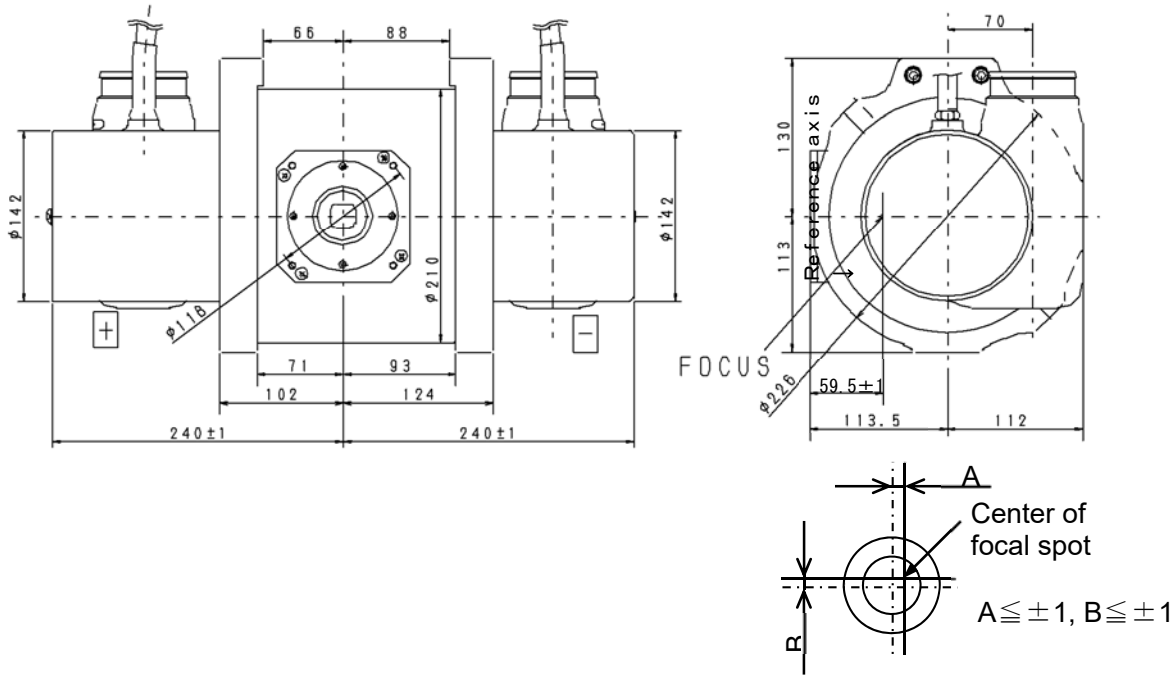
Description	Model	Type1	Type 2
X-ray tube assembly	0.7/1.2JG326D-265	○	○
Trunnion ring*1	B-22A	(○)	(○)
Heat exchanger	HE-12S	○	
	HE-05S		○
Oil vessel	―	○	○
Accompanying document	Operation Manual	○	○
	Installation Manual	○	○
	Inspection Certification	○	○

*1 Optional parts. In some cases, it is not included in replacement X-ray tube assembly.

2 INSTALLATION CONDITION

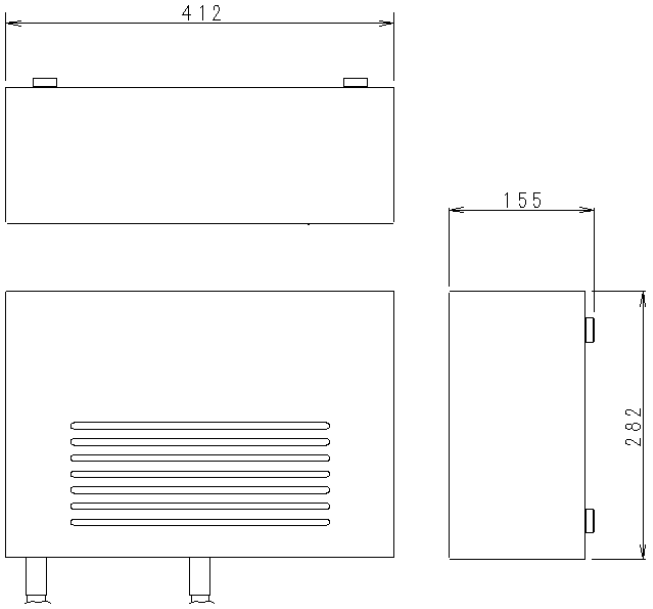
2.1 DIMENSIONS

Refer to Fig.1, Fig.2 and Fig.3.



UNIT: mm

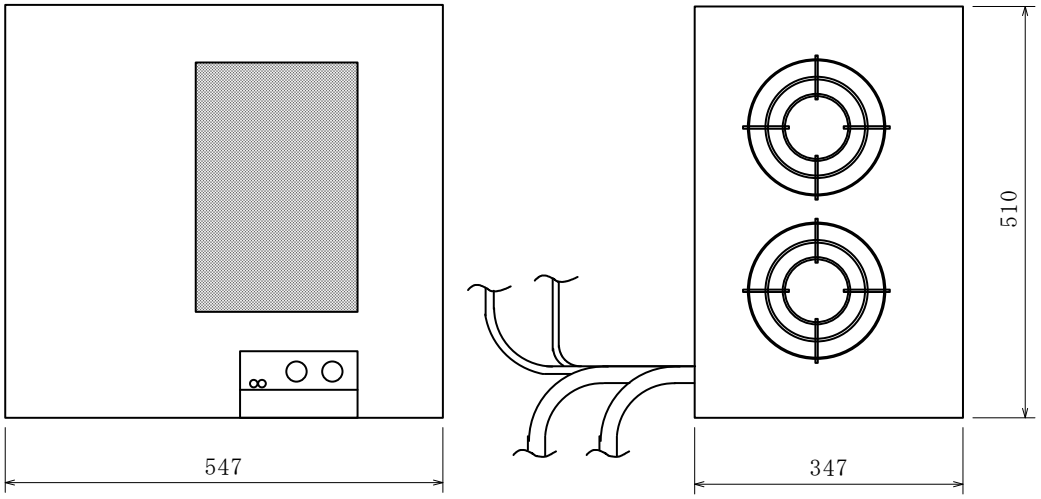
Fig.1 X-RAY TUBE ASSEMBLY



Oil hose:max. 14m

Unit: mm

Fig.2 HEAT EXCHANGER HE-12S



Oil hose: 26m

Unit: mm

Fig.3 HEAT EXCHANGER HE-05S

2.2 CAUTION FOR INSTLLATION CONDITION

(a) Set up in X-rays controlled area.

(b) Avoid in the atomosphere where there are inflammable and toxic gas.

(c) Install in the place where becomes the following condition when using the equipment.

Ambient temp. : 5 - 40 °C

Relative humidity : 30 - 90 % (No condensation)

Atmospheric pressure : 700 - 1,060 hPa {70 - 106kPa}

2.3 INSTALLATION CONDITION FOR HE-05S(FOR TYPE2)

(a) Install the HE-05S on a level place,avoiding slopes.

(b) The height difference of setting position between the heat exchanger and X-ray tube shall be less than 2.5m or some trouble, such as lack of oil flow or thermal switch misoperation, will occur.

3 INSTALLATION METHOD

3.1 INSTALLATION OF X-RAY TUBE ASSEMBLY AND HE-12S(TYPE1)

Refer to installation manual of X-ray system and chapter 4, 5, 6 and 8 in this manual.

3.2 INSTALLATION OF HE-05S(TYPE2)

Refer to chapter 7 in this manual.

3.3 STARTER SETTING

This X-ray tube shall be combined with Shimadzu starter SA-61.

Conditions and setting are as follows. For detail, refer to SA-61 INSTALLATION MANUAL. (M516-E307) or D150BC-40S INSTALLATION MANUAL (M501-E401).

Table2 ROTATIONAL PERFORMANCE

Mode		Start conditions			Specified rotational speed holding conditions				Phase advancer capacitor
Basic rotational Speed	Specified Rotational speed	Time	Frequency	Voltage	On time	Off Time	Frequency	Voltage	
Stop	Triple rotation	3.5s	180Hz	500V	1s	25s	180Hz	500V	5μF
Stop	Double rotation	3.5s	120Hz	280V	0.28s	15s	120Hz	280V	10μF
Double Rotation	Triple rotation	0.8s	180Hz	500V	1s	25s	180Hz	500V	5μF

Mode		Damping conditions			Phase advancer capacitor
Basic rotational Speed	Specified Rotational speed	Time	Frequency	Voltage	
Triple rotation	Double rotation	3.5s	120Hz	280V	10μF
Double rotation	Normal rotation	2.0s	DC	260V	---------

NOTE1: Selecting the anode code 1, conditions shown in Table2 are set automatically.

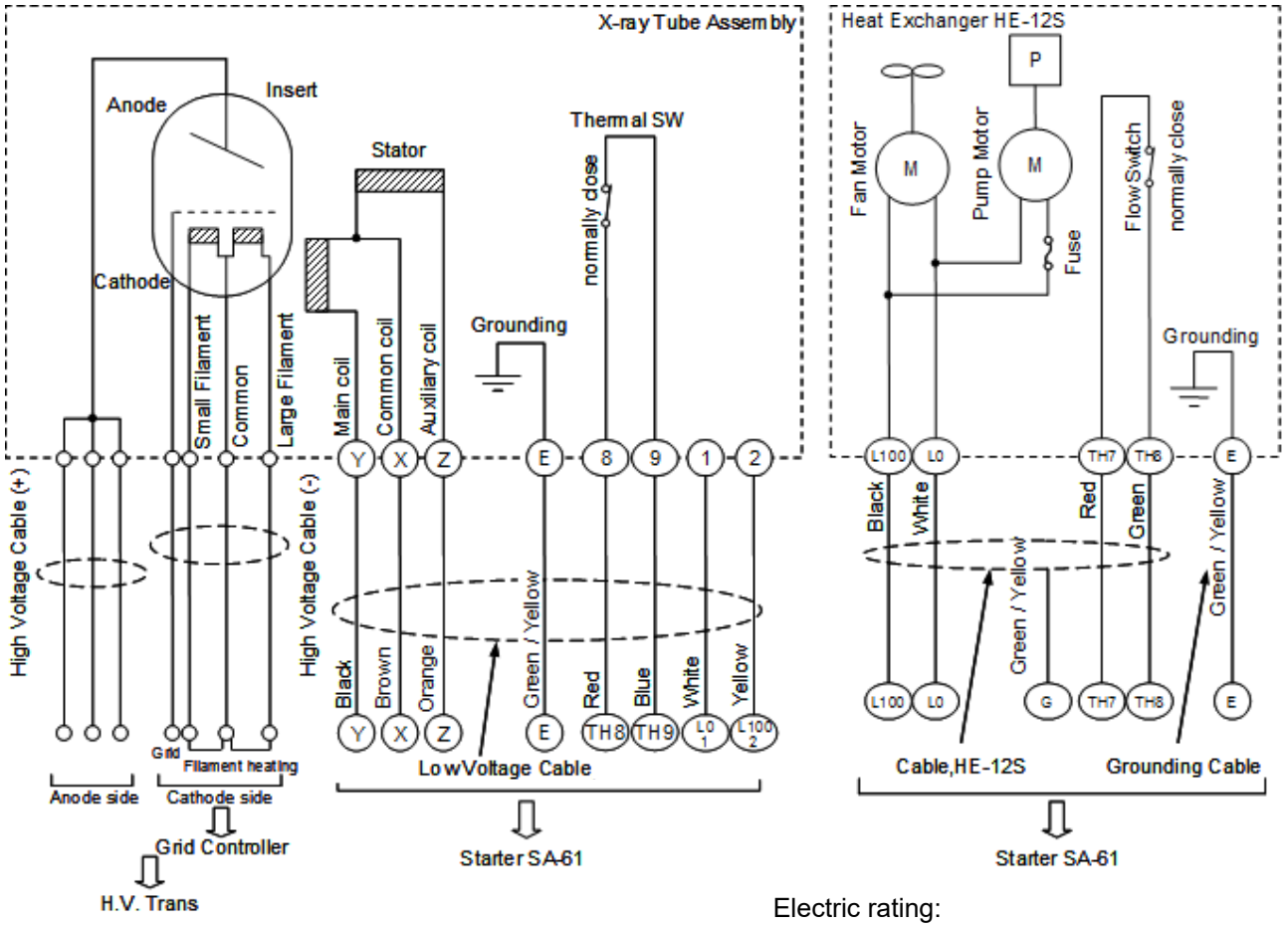
NOTE2: As excessive starter voltage causes to stator trouble and unnecessary heat, adjust stator voltage from -2% to +5%.

Table 3 INITIAL SETTING ITEMS

Setting item	Selecting item	Remark
1HS(2HS)	465	Terminal TB1 connection place
1NS(2NS)	150	
1BS(2BS)	220	
X-ray Tube Code(only NEXSH)	09	General mode
Anode code	Code 1	
Stator type	R (Regular)	
High speed rotation hold time	0 (no rotation hold)	Option mode
Middle speed rotation hold time	70sec	
Interlock reset time	0.0sec (no reset time)	

4 CABLES CONNECTION

4.1 CONNECTION DIAGRAM FOR TYPE1 (WITH HE-12S)



Electric rating:

Thermal Switch : AC250V, 5A

Flow Switch : AC200V, 50W

Fuse rating : AC250V, 4A or AC250V, 5A

(depending on the pump type)

Fig.4-1 CONNECTION DIAGRAM of Type 1 (with HE-12S)

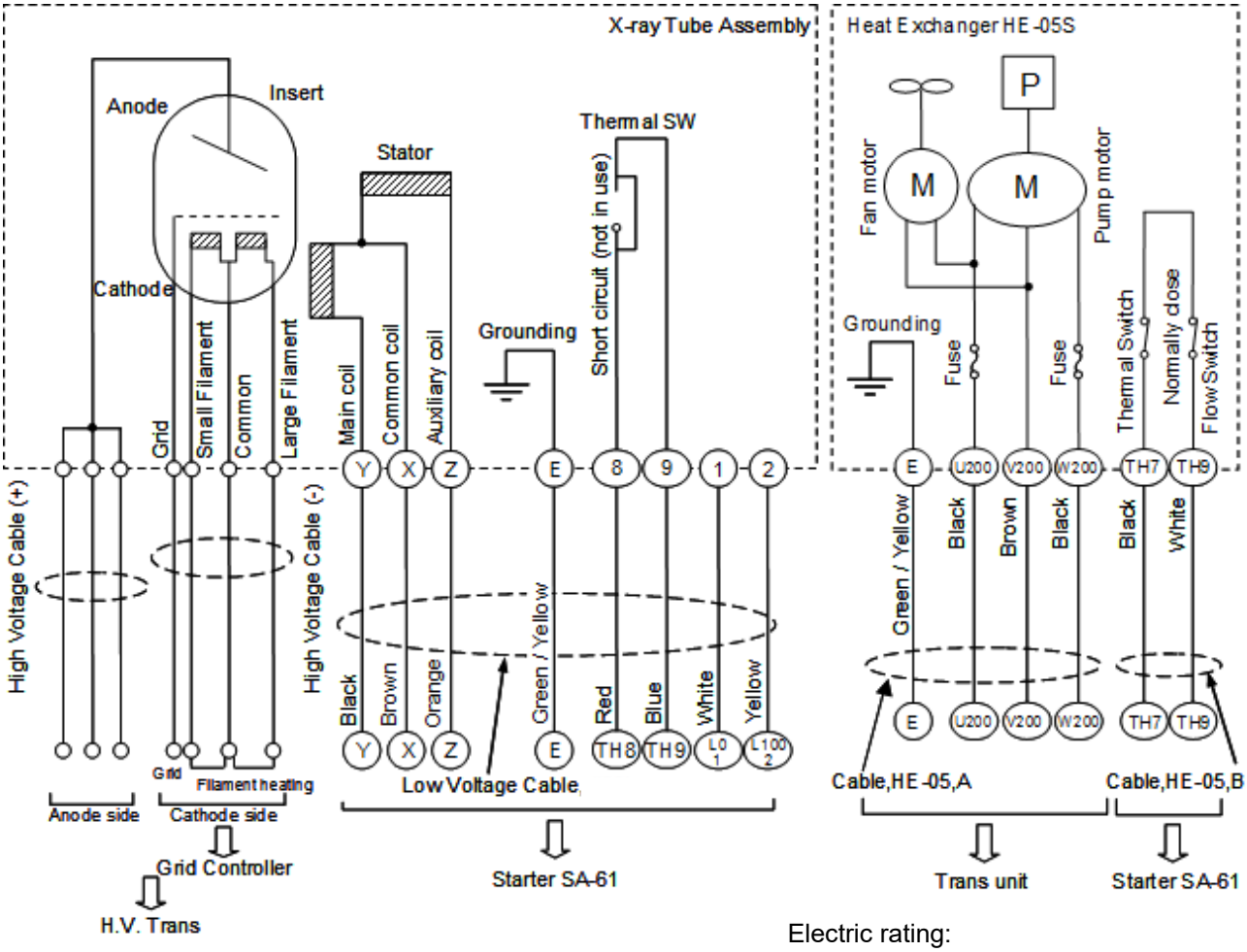
Note1: Terminals TH9 of the low voltage cables are to be connected at the terminal board on the starter SA-61.

Note2: This X-ray tube has a glass envelope, so metal center terminal does not exist.

WARNING

To avoid the risk of electric shock, this equipment must only be connected to a supply with protective earth.

4.2 CONNECTION DIAGRAM FOR TYPE2 (WITH HE-05S)



Electric rating:
Thermal Switch : AC110V, 6W
Flow Switch : AC200V, 50W
Fuse rating : AC250V, 2A

Fig.4-2 CONNECTION DIAGRAM of Type 2 (with HE-05S)

Note1: Terminal TH8 and TH9 on the anode side plate are connected with a thin plate.
Heat exchanger HE-05S is equipped thermal switch as well as flow switch.

Note2: This X-ray tube has a glass envelope, so metal center terminal does not exist.

WARNING

To avoid the risk of electric shock, this equipment must only be connected to a supply with protective earth.

5 HIGH VOLTAGE CABLE CONNECTION

Procedure of connecting high voltage cables is as follows:

(1) Make sure of turning off all power switches.

WARNING

Risk of electric shock.(±75kVp)
Execute grounding of the terminals after turning the all power switches off. This eliminates residual electric charge.

(2) Wipe the surface of the Cable heads and the Sockets with dry cloth.
(Be careful not to use organic chemical for cleaning.) If the insulating grease remains on the socket, wipe it off using the grease removing board (P/N:531-93211).

(3) (Cable head white type) Loosen the Locking screws of the Ring nut with a Hexagon socket and install it to the high voltage cable.

(4) (Cable head white type) Set the Division flange (Bolt tightening type) on the Ring flange.

NOTE

Note the direction of the installation of the Split flange.
(Bolt tightening type).
Please refer to Fig.5-2 for the direction of the installation.

(5) Squeeze the grease (P/N: 017-30816-01) from the tube by 1cm and apply it to the ce nter of the plug top of the High-Voltage cable (see Photo 1).

(6) Attach the specified silicon packing (see Table 4) to the plug top. Push out the grease to the periphery so that no air remains between the silicon packing and the plug top. Remove the grease stuck out from the silicon packing (see Photo 2).

Table 4 Specified silicon packing

	PN	Parts name	Thickness
For 3-core cables	582-23029	High-voltage plug packing #3	3mm
For 4-core cables	582-24381	High-voltage plug packing #5	3mm

Note: Since the cable head joint of the tube voltmeter (ALCO, etc.) has narrow screw threads, the packing for the tube voltmeter is thinner (2mm) than for the 3-core packings (3-mm thick). (High-voltage plug packing #3, 582-23061)

Photo 1
(Cable head white type is also the same.)

Photo 2
(Cable head white type is also the same.)

(7) Squeeze the grease from the tube by 8 cm and apply it thinly and evenly over the si de of the plug (see Photo 3 and 4).

Photo 3
(Cable head white type is also the same.)

Photo 4
(Cable head white type is also the same.)

(8) Squeeze the grease from the tube by 1 cm and put it on the center of the silicon packing at the top (see Photo 5).

Photo 5
(Cable head white type is also the same.)

(9) Put the Cable heads into the Sockets.

Check the direction in which the plug is installed, insert it into the receptacle, and ins ert the pin at the top into the hole.

If the grease remains in the receptacle or if the silicone packing was used once, the plug may not be fully inserted. Remove the grease beforehand and use a new silicon e packing.

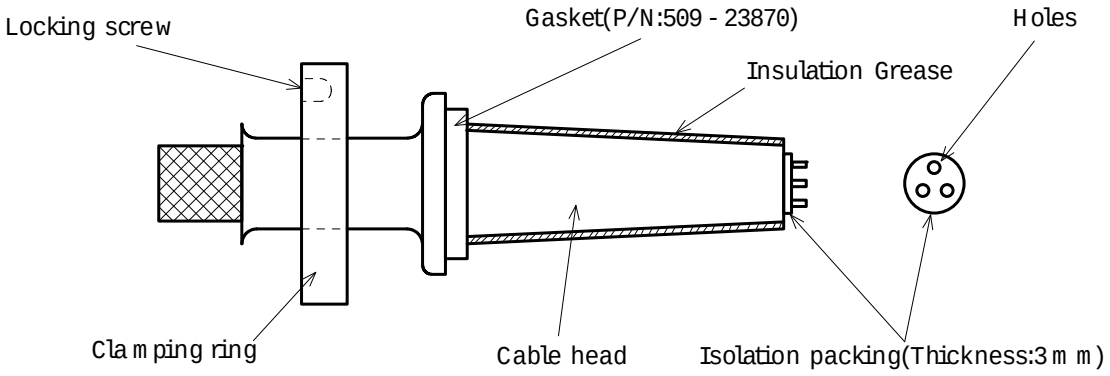


Fig. 5-1 Cable Head (Black)

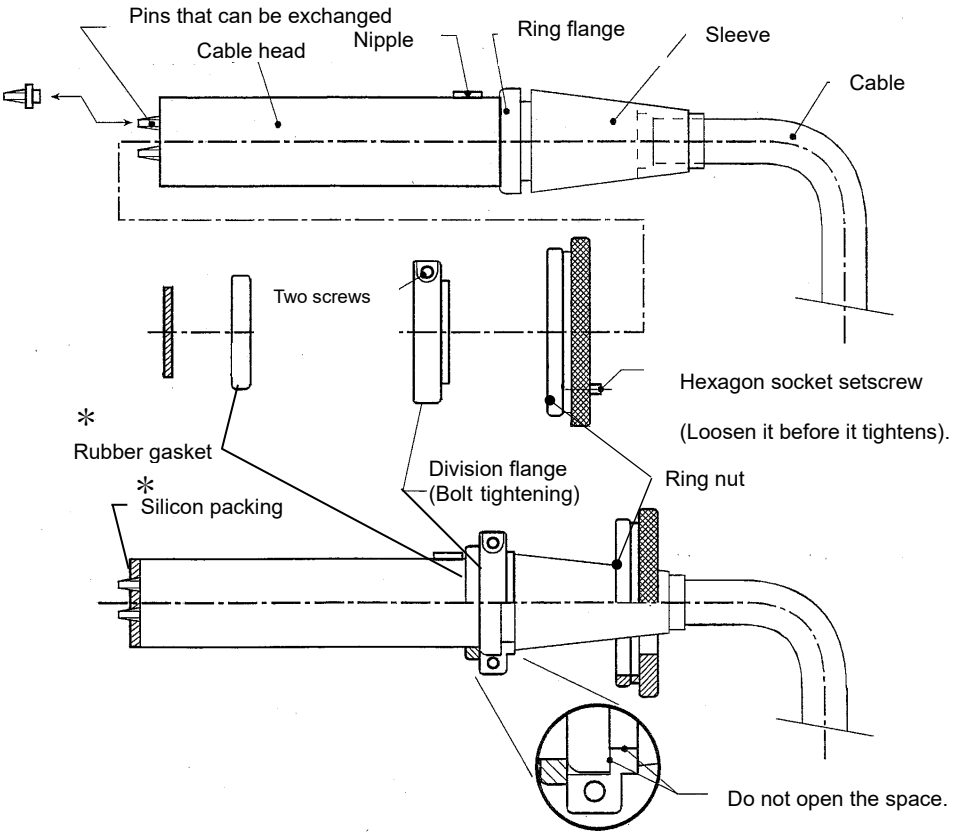


Fig. 5-2 Cable Head (White)

(10) When the high-voltage cable is 3 core cable, screw up the clamping rings by hand, and tighten them completely by a specified tool (P/N 531-96584). The range of screwing up by the tool should be within 1/4～1/2 rotated position from that by handwork. When the high-voltage cable is 4 core cable, screw up the clamping rings by hand.

(11) Wait for about 10 minutes after tightening, tighten them again with the same amount of force in step 10. The grease may move after the first tightening to create a gap and get loose. Be sure to tighten again.

(12) Tighten the locking screw. The packing should be replaced for new one every one ye ar. But, be sure to change the packing whenever the H.V. cable head is disconnected from H.V. Sockets for repair or maintenance purpose. Be careful of electric shock whe n disconnecting the high-voltage cable.

6 LOW VOLTAGE CABLE CONNECTION

6.1 LOW VOLTAGE CABLE CONNECTION FOR TYPE1 (WITH HE-12S)

(a) Be sure to connect the low voltage cable with the apparatus side correctly.

(b) Take off the cover on anode side of the X-ray tube assembly main unit for rewiring, if necessary. For wiring to the terminal board, see Fig.6-1.

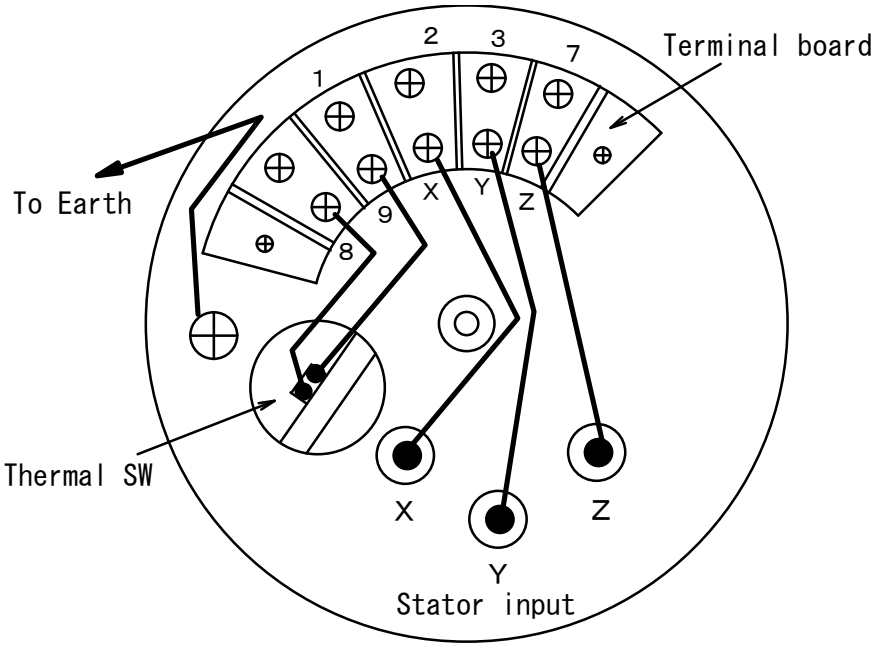


Fig.6-1 LOW VOLTAGE CABLE TERMINAL BOARD (TYPE1)

WARNING

Risk of electric shock. Execute wiring to the terminal board after turning off all power switches.

6.2 LOW VOLTAGE CABLE CONNECTION FOR TYPE2 (WITH HE-05S)

(a) Be sure to connect the low voltage cable with the apparatus side correctly.

(b) Take off the cover on anode side of the X-ray tube assembly main unit for rewiring, if necessary. For wiring to the terminal board, see Fig.6-2.

(c) Confirm the terminal TH8 and TH9 are connected with a thin metal to prevent the thermal switch from misworking.

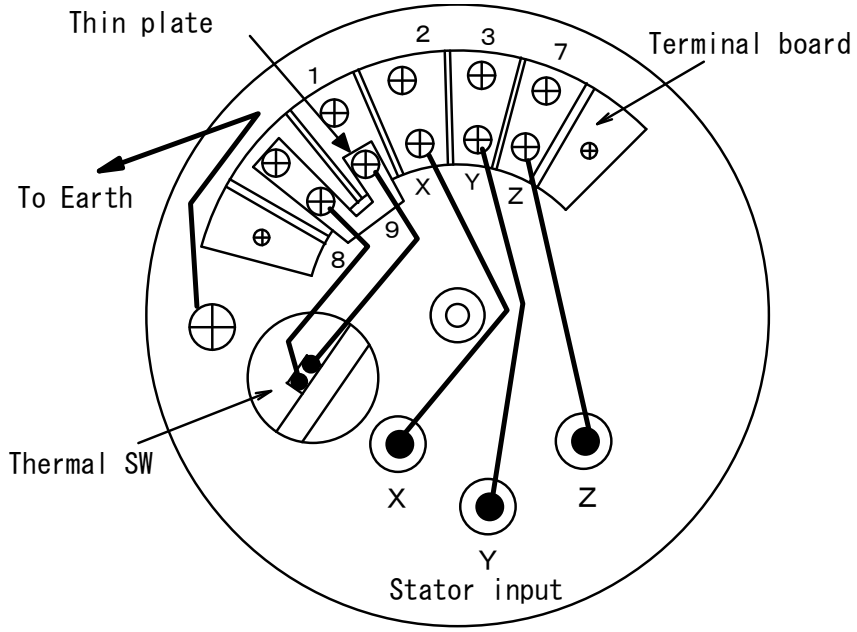


Fig.6-2 LOW VOLTAGE CABLE TERMINAL BOARD (TYPE2)

WARNING

Risk of electric shock. Execute wiring to the terminal board after turning off all power switches.

7 INSTALLATION OF HE-05S (FOR TYPE2)

7.1 CAUTION FOR INSTALLATION

(a) Pay close attention to safety and the prevention of break due to dropping.

(b) Lift the HE-05S with two persons, since the HE-05S without insulating oil is over 45kg.

(c) Keep oil hoses over minimum bent radius 90mm.

(d) Do not join oil hoses to X-ray tube assembly before executing REMOVING AIR(section 7.3).

7.2 FILLING OIL RESERVOIR WITH INSULATING OIL

Oil reservoir of a HE-05S is empty on shipping and insulating oil is packed separately.

Fill the oil reservoir with insulating oil as following procedure before connecting oil hoses.

(a) Remove both sides of covers with a Phillips driver.

(b) Unfasten three supporters and remove the reservoir lid.

(c) Fill the reservoir with about 20l oil and attach the lid.

(d) Fix the reservoir with three supporters and attach the side covers.

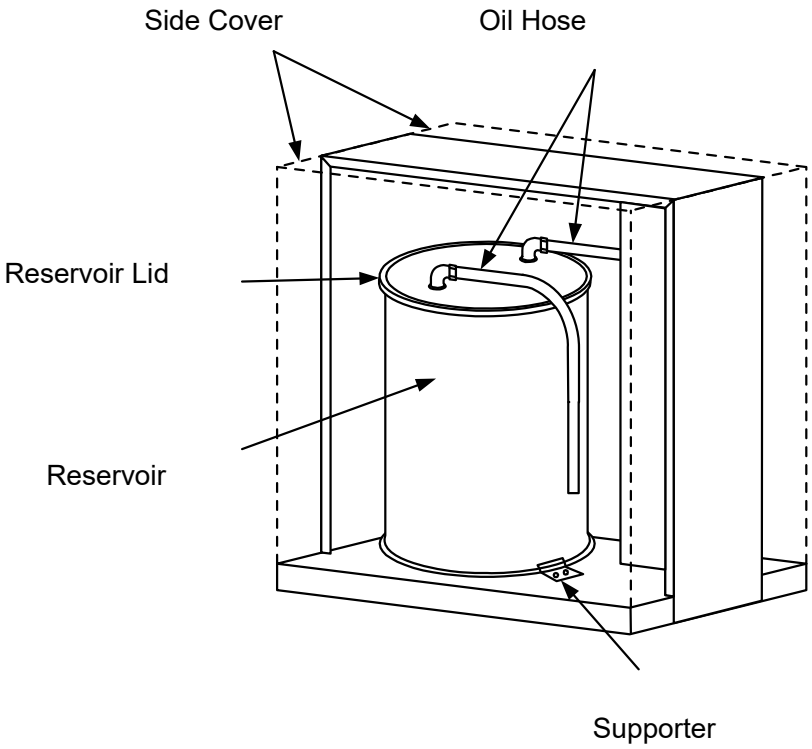


Fig.7 INSIDE OF HE-05S

7.3 REMOVING AIR OF HEAT EXCHANGER HE-05S

(a) Join oil hoses to HE-05S after FILLING OIL RESERVOIR(section 7.2).

(b) Join each connector to HOSE ASSY, HE-05, E (P/N 582-24007-05) and construct the close oil circuit as follows.

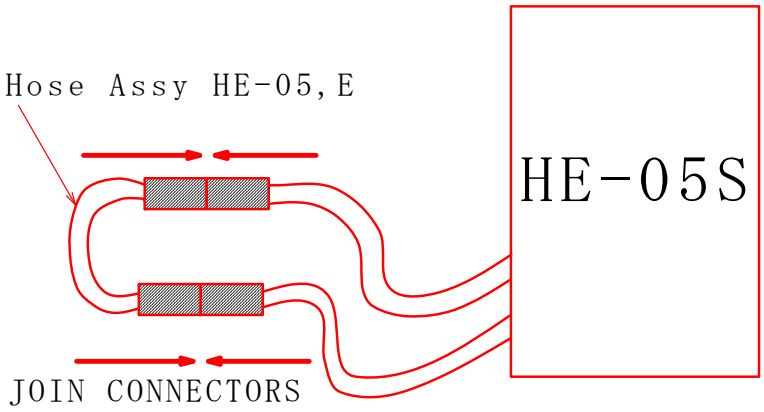


Fig.8 CONNECTION OF REMOVING AIR OF HE-05S

(c) Turn on the Heat Exchanger for 30 minutes.

CAUTION

Don't turn on without joining each connector.

(d) Turn off the Heat Exchanger.

(e) Separate the connectors from HOSE ASSY, HE-05, E and join each connector to the X-ray tube assembly side connector according to following Chapter 8.

8 HOSE CONNECTING

When attachment/detachment of quick connectors, see the following procedure.

(a) Adjust "dent" and "protrusion" in position. Then, pull area A of the female connector in direction indicated by arrow as shown in the Fig.9. Spring in the connector works for disconnection.

(b) Leak of a little amount of insulating oil occurs when the quick connectors is removed.

(c) It, however, does not affect performance of the instruments. Wipe off the oil completely using clean rag.

(d) After disconnect, be sure to put the caps of the male connector.

(e) If not, infiltration of air bubbles occurs when the point of the male connector is pushed by accident.

(f) For connection of quick connectors, be sure to set the marks (IN or OUT) of the female and the male connector.

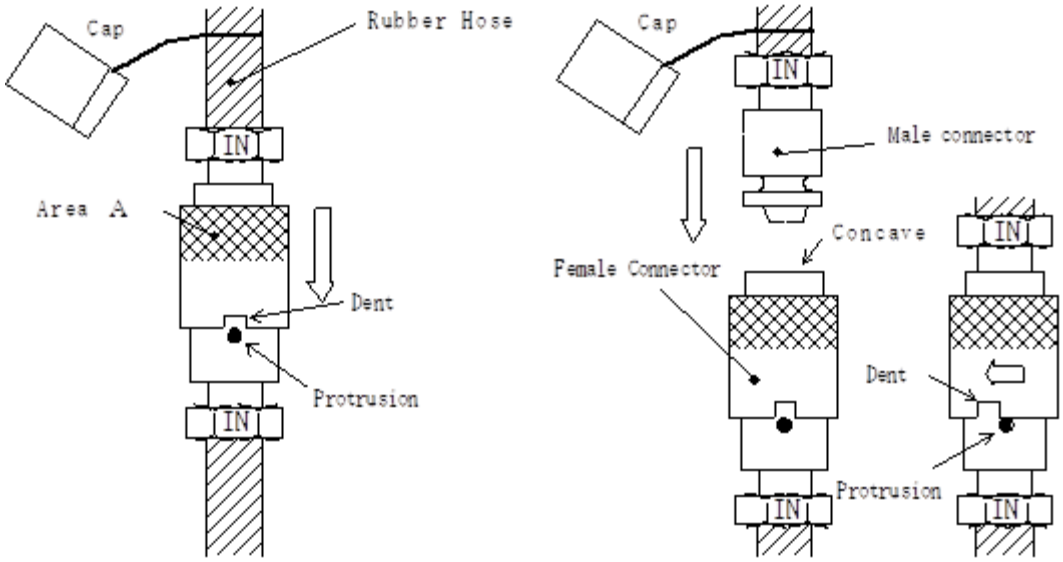


Fig.9 ATTACHMENT/DETACHMENT OF QUICK CONNECTOR

(g) For connection of the quick connectors, be sure to pour insulation oil up to the level of the ball provided in the concave using the supplied oiling device with the opening of the female connector directed upward so as to prevent infiltration of air bubbles during connection. Then connect the female connector (Figure right above). Wipe off insulating oil overflow completely using clean rag.

(h) Furthermore, turn area of A of the female connector to deviate position of the dent and protrusion (lock mechanism).

(i) The quick connectors is a part so designed to facilitate easy installation. If the precautions described here are not observed, infiltration of air bubbles occurs, possibly causing a serious trouble. Be sure to follow the procedures shown.

CAUTION

Don't turn on without joining each connector.

CAUTION

Be careful of exposure to attachment/detachment of the quick connectors. Attachment/detachment thereof should be made in least possible times.

NOTE

Use only the specified insulating oil at OIL VESSEL included in the product. Avoid use of insulating oil other than specified.

9 ADJUSTMENT

9.1 PRECAUTION ON ADJUSTMENT

(a) Adjust tube voltage and tube current on the sufficient understanding of the manuals for Shimadzu high voltage generator.

(b) Be sure to close the collimator or place an X-ray shielding object before the X-ray radiation port so as to reduce the X-ray fully, when it is generated.

WARNING

Be careful of exposure to X-ray.
Take measures for protection from X-ray.

(c) In the case where the line frequency is in deviation.

(i) If the deviation is up to +10%, the X-ray tube can be used normally.

(ii) If the deviation is down to -10%, use the X-ray tube by lowering the rating in proportion to the frequency.

(d) Check the high voltage generator thoroughly. The measuring tools such as the timers and meters are required to have sufficient accuracy.

(e) Do not load high voltage without tube current.

(f) When the X-ray tube assembly is newly installed or replaced to a new one, it is necessary to adjust or readjust tube current and monitor tube voltage with a suitable high voltage bleeder. In case that the filament characteristic of the new X-ray tube is better than that of the replaced one, a large tube current may cause to shorten the life of X-ray tube by overload.

(g) Use the apparatus with the filament current of **less than 5.6A for both filaments** (Refer to FILAMENT CHARACTERISTICS)

(h) If the X-ray tube assembly is used with the micro computer controlled generator, use the parameter shown in INPUT DATA OF NONSTANDARD TUBE DATA MODE.

9.2 INITIAL SEASONING

When using the X-ray tube assembly for the first time after its installation, initial seasoning of which conditions shown as follows must be carried out.

(a) With the X-ray tube current kept at 2.5mA, raises the X-ray tube voltage gradually from 60kV to 120kV at the rate of 10kV/minute and keep the tube voltage 120kV for 5 minutes.

(b) Take the rest time for 5 minutes

(c) Raise the X-ray tube voltage with a large focus as follows, and apply the following load at the rate of once in one minute per each voltage.

① 70kV, 250mA, 1sec--------- 1 exposure
② 80kV, 250mA, 1sec ------- 1 exposure
③ 90kV, 250mA, 1sec ------- 1 exposure
④ 100kV, 250mA, 1sec ------- 5 exposures
⑤ 110kV, 250mA, 0.1sec ------- 1 exposure
⑥ 120kV, 250mA, 0.1sec ------- 1 exposure
⑦ 125kV, 250mA, 0.1sec ------- 1 exposure
⑧ 130kV, 250mA, 0.1sec -------- 2 exposures
⑨ 135kV, 250mA, 0.1sec -------- 2 exposures
⑩ 140kV, 250mA, 0.1sec -------- 2 exposures
⑪ 145kV, 250mA, 0.1sec ------- 2 exposures
⑫ 150kV, 250mA, 0.1sec -------- 2 exposures

(d) Take 10 min. rest.

(e) When there is such abnormality as unstable tube current during the seasoning, lower the tube voltage to where it becomes stable, keep the tube voltage for a while, and then rise the tube voltage again.

10 MAINTENANCE

Periodical check of the X-ray tube assembly is necessary to maintain its stable performance and life for many years.

10.1 APPEARANCE

Check no oil leakage from the X-ray tube housing and heat exchanger.

Check no abnormal sound from pump and cooling fan of heat exchanger.

10.2 SAFETY CIRCUIT

Check function of this circuit (see Fig.4), continuity of ground terminal wire, etc.

Should there be the case where the thermal switch actuates, contact us or our agent because such a situation is abnormal.

10.3 CONNECTION OF CABLES

Replace the isolation packing with new one every year. Be sure to replace it whenever H.V. cable is disconnected from H.V. socket for repair or maintenance purpose. Replacement shall be done by our service person.

For connecting and disconnection, please refer to chapter 6.

10.4 RESISTANCE OF STATOR COIL

Measure the resistance between X and Y, X and Z, and Y and Z on the terminal board of X-ray tube assembly and check the measured value within the following range.

X-Y : 14.0 - 18.0 Ω, X-Z : 45.0 - 55.0 Ω, Y-Z : 59.0 - 73.0 Ω

WARNING

Risk of electric shock. Be sure to measure the resistance after power has been turned off.

10.5 CLEANING

Use absolute ethanol to clean the X-ray tube assembly.

10.6 OIL LEVEL CHECK(FOR HE-05S ONLY)

An oil level indicator is mounted at the cap of an oil tank. Please take out the indicator from a tank and confirm that the position of oil surface level is at the knurling area of the indicator.

10.7 REPLACEMENT OF FUSE

Replacement shall be done by our service personnel.

The procedures of replacement of fuses are follows.

(a) Confirm the X-ray tube assembly is cooled and power off the high voltage generator and the heat exchanger.

(b) Remove the cover of heat exchanger with a Phillips driver.

(c) Replace fuses with the specified type only. (refer to Table 4)

(d) Attach the cover to the heat exchanger.

WARNING

Risk of electric shock. Be sure to remove the cover of heat exchanger after power has been turned off.

10.8 RENEWAL OF DETACHABLE HOSE

It is necessary to renew the oil hose every five years for the heat exchanger equipping detachable hose.

Please contact us or our agent for hose renewal.

10.9 RENEWAL OF INSULATING OIL (FOR HE-05S ONLY).

Insulating oil in HE-05S shall be changed to new one at the earlier period of following conditions. Contact the users prior to the period and carry out the changing insulating oil

(a) Two years after newly installation or the last oil changing.

(b) At the third replacement of X-ray tube assembly after newly installation or the last oil changing.

The procedures of renewal of insulating oil are follows.

(c) Confirm the X-ray tube assembly is cooled and High voltage generator and HE-05S are powered off.

(d) Disconnect the connectors of X-ray tube assembly and join the HE-05S connectors itself with HOSE ASSY, HE-05, E (P/N 582-24007-05).

(e) Unfasten three supporter of the reservoir, detach it's lid and remove old oil.

(f) After cleaning inside of the reservoir, pour new oil into it by 10L.

(g) Turn on the Heat Exchanger for 5 minutes and remove old oil again.

(h) Pour new oil in it by 20L, attach the lid and fix it with three supporters.

(i) Turn on the heat exchanger for 30 minutes.

(j) Separate the connectors from HOSE ASSY, HE-05, E and join each connector to the X-ray tube assembly side connector.

11 TROUBLESHOOTING

If any troubles occur, contact your nearest service organ without disassembling the tube assembly by yourselves.

(a) In the following cases of anode rotation, you may continue using the X-ray tube.

① Rotating sound is high, but it is continuous sound and there is no abnormal sound like creak or scratch sound during rotation.

② Inertial rotation of the X-ray tube continues over 2 minutes after loading, and rotation does not stop quickly. (Check for this after DC brake works after fluoroscopy)

(b) There might be a case of a small flaw or stain-like trace on the target of the X-ray tube, but this is due to small discharge occurring in the course of seasoning. As far as steady operation is conducted at Nominal X-ray tube voltage attained at the end of seasoning described in Subsection 8.2, there is no hindrance to electrical performance.

12 MAINTENANCE PARTS

Our company service representative will exchange the maintenance parts of this product.

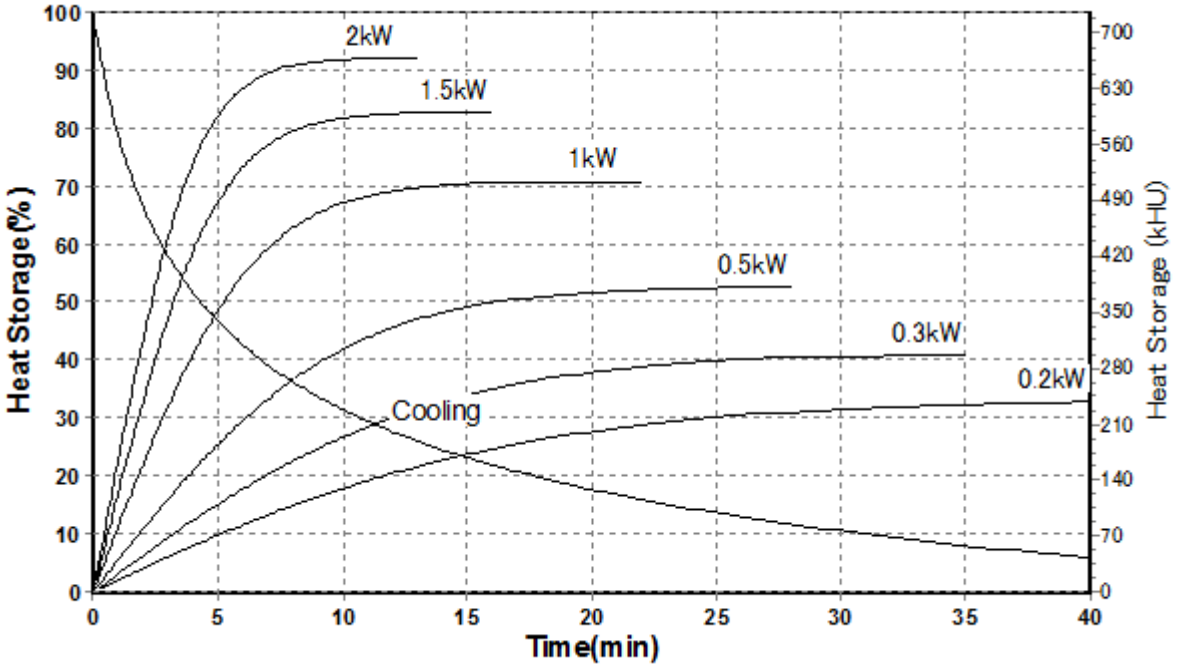
Refer to the Table 5 for a list of the maintenance parts.

Table 5 LIST OF MAINTENANCE PARTS

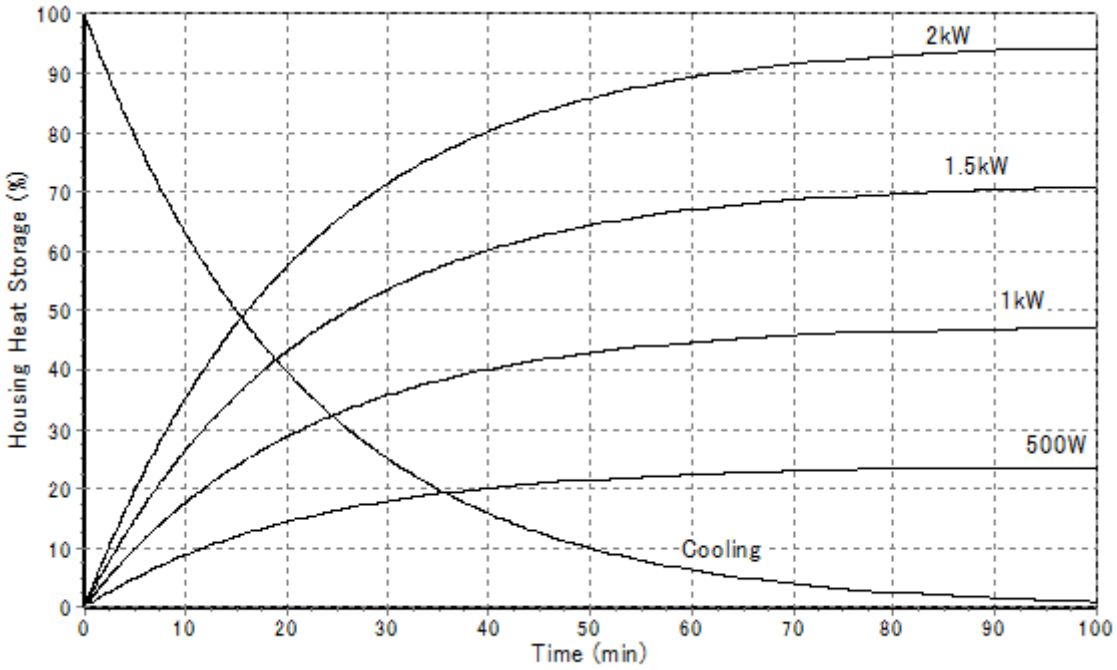
	Parts name	Parts number	Necessary amount
X-ray tube main unit	Low voltage cable, #21L	582-24776-11	1pc
	Trunnion ring, B-22A	582-22966-01	1set
	Packing,#1	582-23029	1pc
	Packing,#5	582-24381	1pc
HE-12S	Cable HE-12S	582-24741	1pc
	Fuse, FGA0-2 4A *1	572-72000	1pc
	Fuse, FGA0-2 5A *1	572-72000-01	1pc
	Cable,HE-12S(D)	582-24902	1pc
	Relay Hose Assy	582-24900	2pcs
HE-05S	Cable HE-05, A	582-24008-01	1pc
	Cable HE-05, B	582-24008-02	1pc
	Hose assy, HE-05, A	582-24007-01	1pc
	Hose assy, HE-05, B	582-24007-02	1pc
	Fuse UL CSA FGA0-2	072-01678-07	2pcs
	Insulating oil, transformer S	582-24467	2Cans

*1 Refer to the indication label of fuse rating inside the HE-12S.

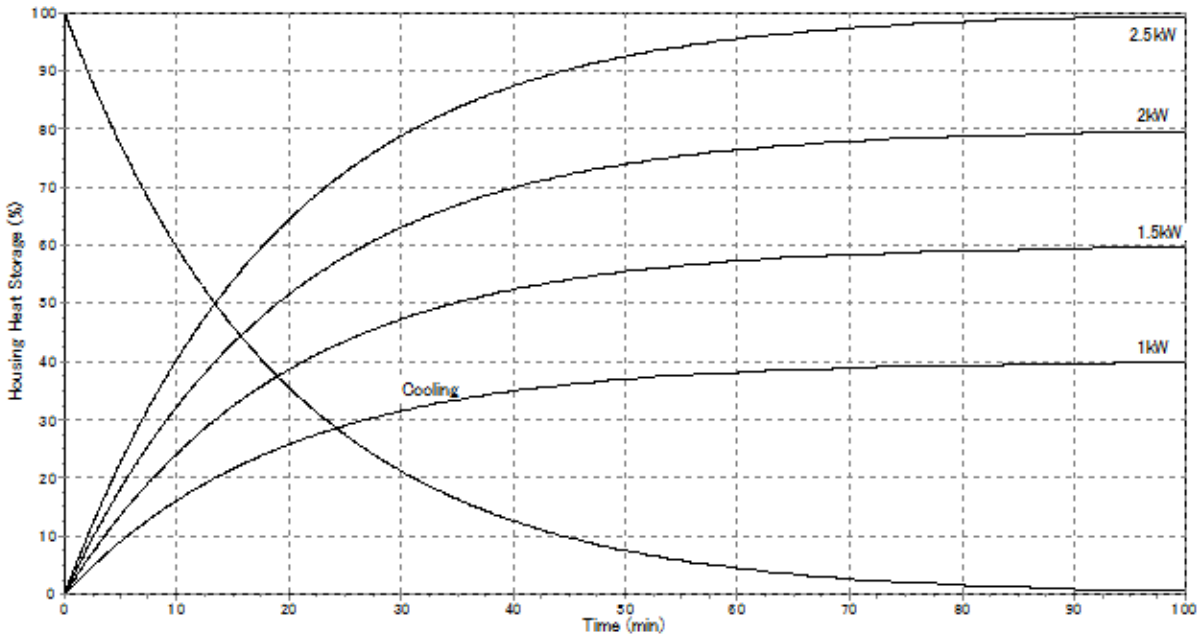
APPENDIX



X-RAY TUBE ASSEMBLY HEATING AND COOLING CURVE (HE-12S)

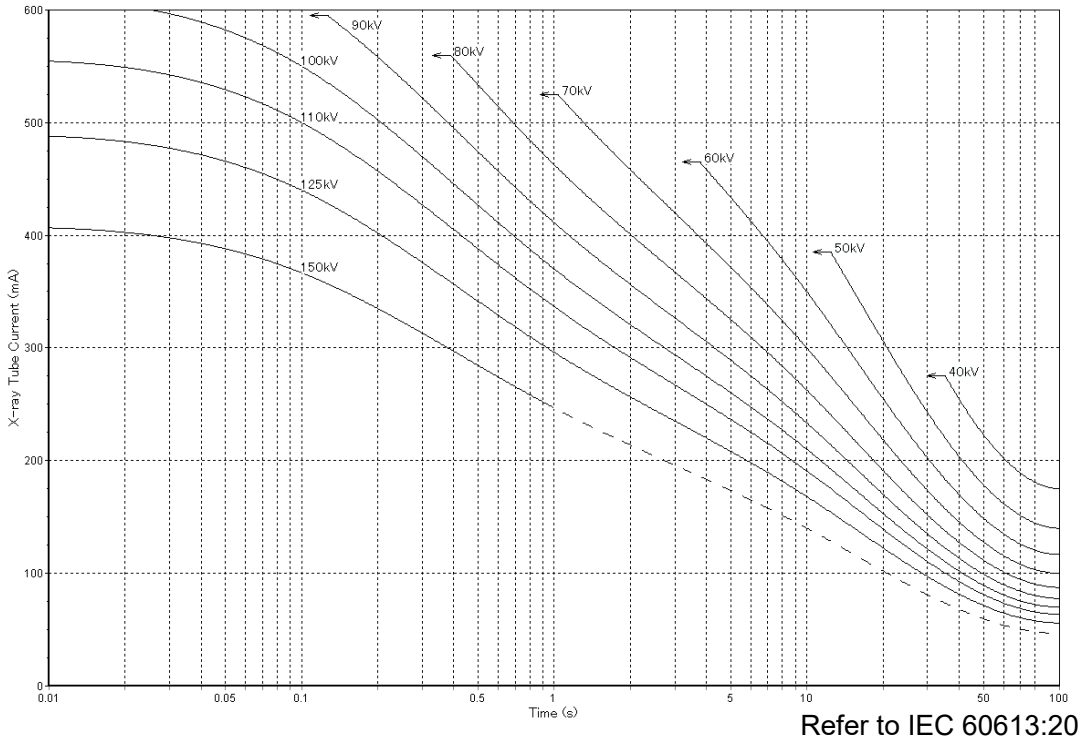


X-RAY TUBE ASSEMBLY HEATING AND COOLING CURVE (HE-05S)



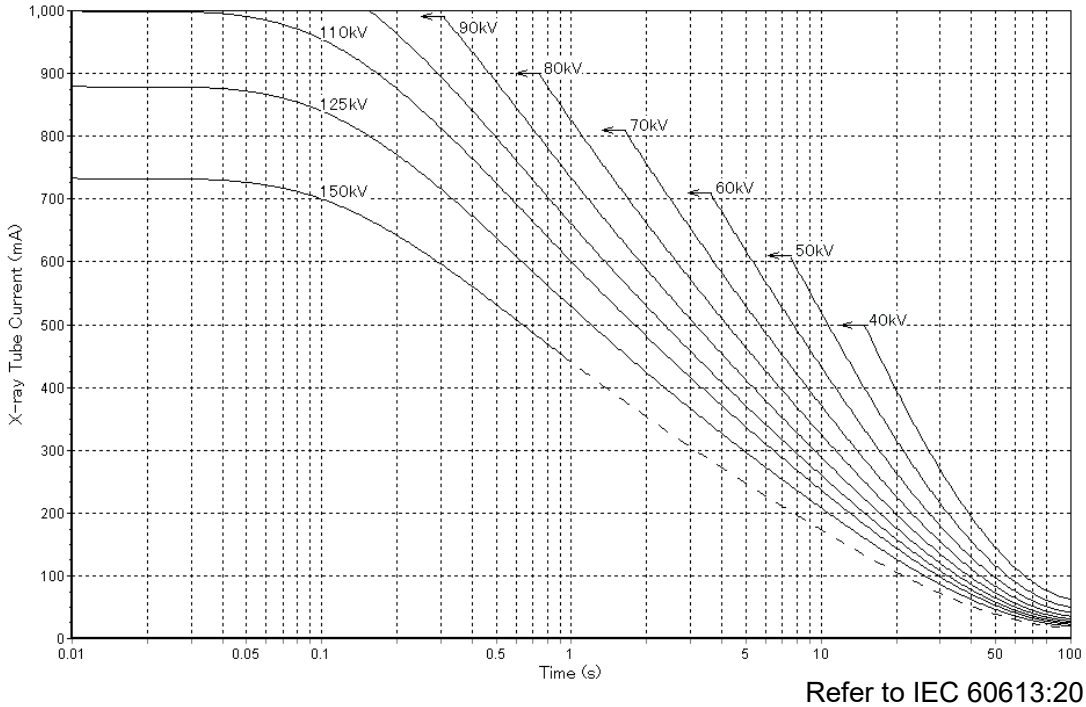
SINGLE LOAD RATING CHARTS

0.7mmFocus Constant Voltage, 180HzRotation



Refer to IEC 60613:2010

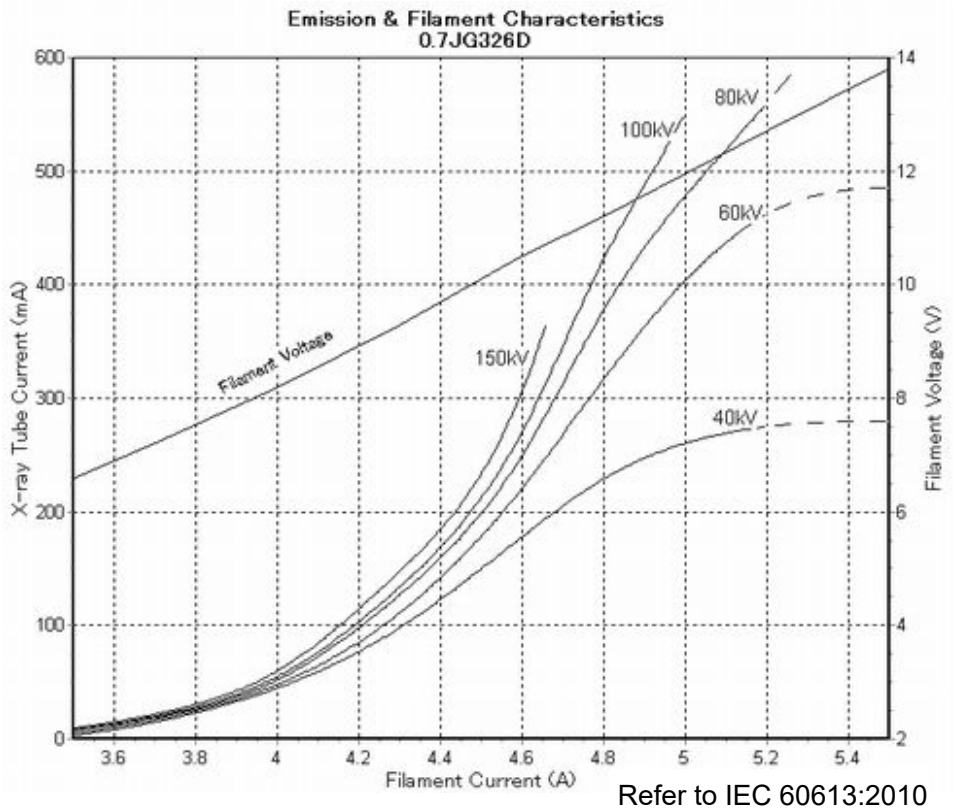
1.2mmFocus Constant Voltage, 180HzRotation



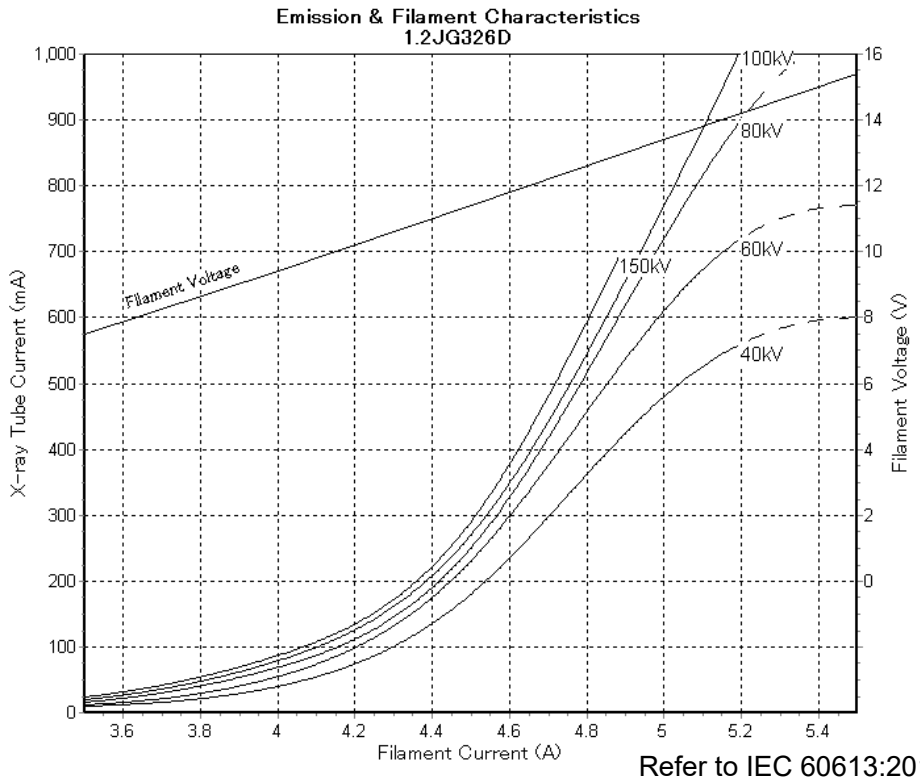
Refer to IEC 60613:2010

CATHODE EMISSION AND FILAMENT CHARACTERISTICS

The curves show the emission characteristic under constant wave and three phase full wave operation. In the case of single phase full wave operation, tube current values are decreased by approximately 30% for same filament current.



Refer to IEC 60613:2010



Refer to IEC 60613:2010

INPUT DATA OF NON STANDARD TUBE DATA MODE

0.7/1.2JG326D

ITEM	Large focus (1.2mm)	Small focus (0.7mm)
Anode rotation speed	High	
Attachment of small focus	Yes	
Number of focuses	2	
kV maximum	150kV	
kV minimum	40kV	
HU factor	0.9	
Load full on	0.8	
Load full off	0.7	
Maximum heat content	750kHU	
Cooling curve	750kHU····· 0 min 560kHU····· 1 min 370kHU····· 4 min 180kHU·····12 min 0kHU·····45 min	
Emission	40kV·····550mA 60kV·····710mA 80kV·····900mA	40kV·····270mA 60kV·····460mA 80kV·····560mA
Maximum rating 180Hz	150kV,733mA, 0.01s 150kV,725mA, 0.03s 150kV,700mA, 0.1s 150kV,595mA, 0.3s 150kV,440mA, 1s 150kV,300mA, 3s 150kV,245mA, 5s 150kV,170mA,10s 150kV,105mA,20s 150kV, 85mA, 25s 150kV, 60mA, 50s	150kV,405mA, 0.01s 150kV,400mA, 0.03s 150kV,365mA, 0.1s 150kV,310mA, 0.3s 150kV,250mA, 1s 150kV,195mA, 3s 150kV,170mA, 5s 150kV,140mA,10s 150kV,100mA,20s 150kV, 80mA, 25s 150kV, 60mA, 50s
Maximum filament current	5.6 A	5.6 A
mA Position	250～800mA	160～500mA

Refer to installation manual of high voltage generator with detail setting

This page is intentionally left blank.