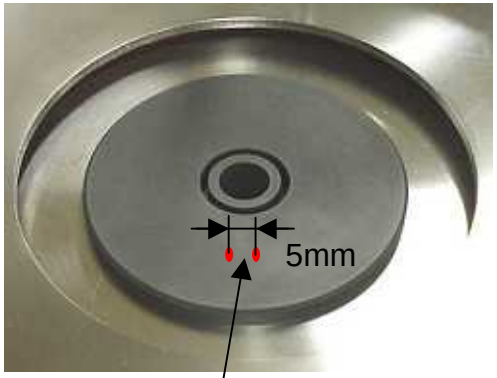
Maintenance manual for BS-80011BPG Plasma source

1) Every-run maintenance
2) Every-day maintenance
3) When replacing the filament
4) Every-month maintenance
5) Cooling water

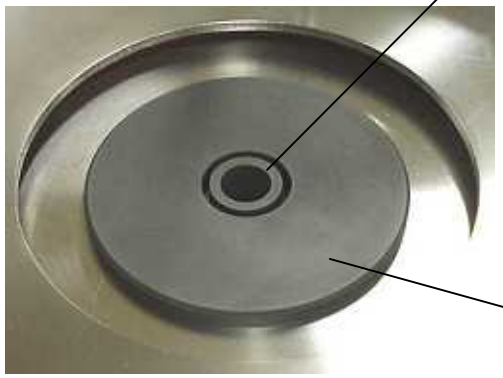
Every-run maintenance

Cleaning of the anode surface

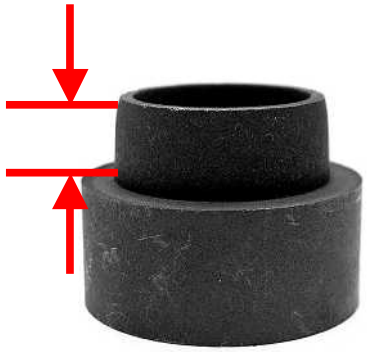


Measure the electric resistance of the anode surface and the anode electrode flange with a tester. Check if the resistance is 0.5Ω or less.

Every-day maintenance



Nozzle



Check if the height of the nozzle head is 5 mm or higher. When the height is less than 5 mm, replace the nozzle with a new one.

Anode

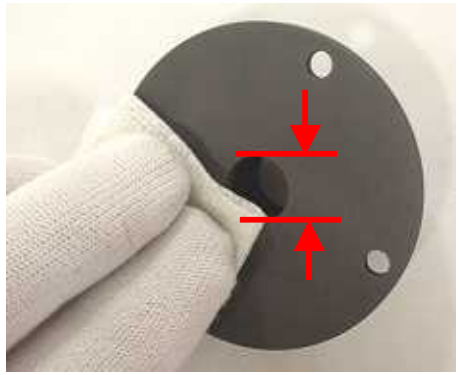
Check if the thickness of the anode is 2 mm or thicker. If the thickness is less than 2 mm, replace the anode with a new one.

When replacing the filament

Pipe

Wipe the rear side of the pipe and check if the diameter of the pipe bore.

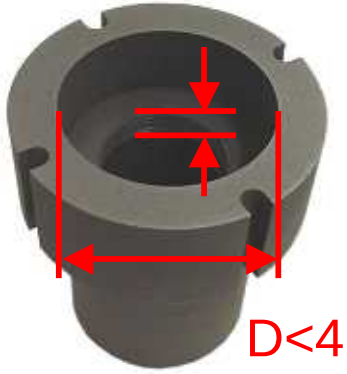
D<14mm



Ring

Check if thickness of the M26 tap section and the diameter of the the cylindrical section .

t>6mm



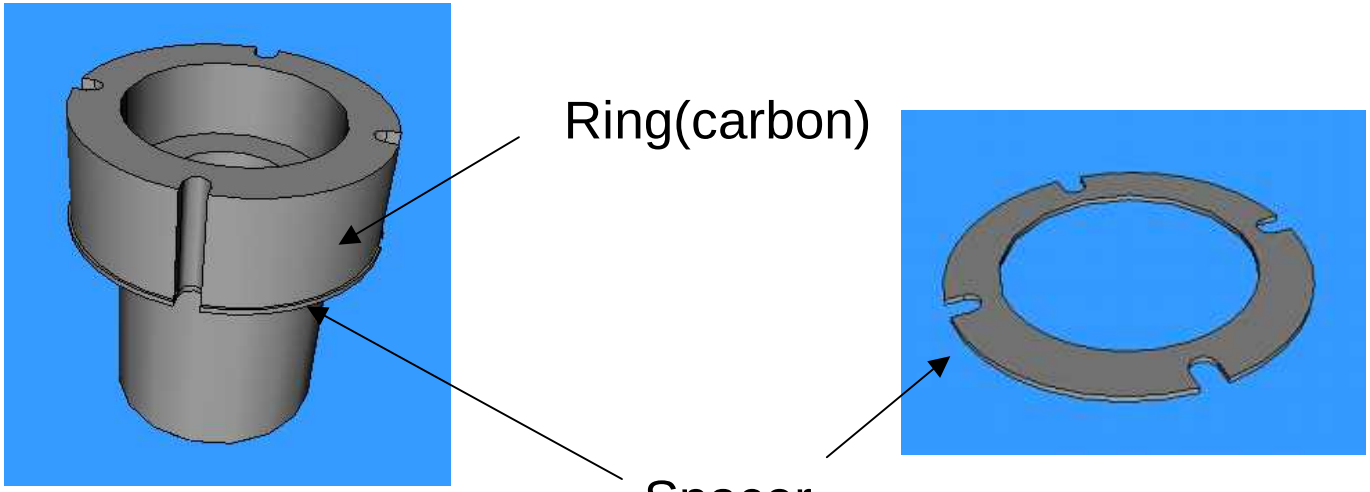
D<42mm

Orifice

Check if the diameter of the orifice bore.

D<5mm

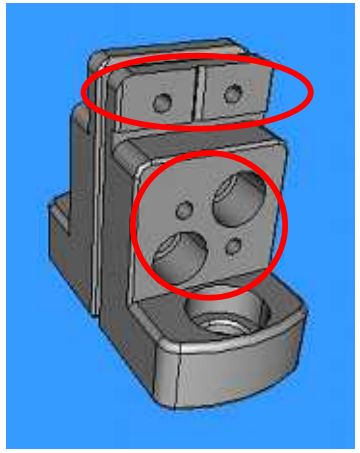
When replacing the filament



The spacer is a part to prevent seizing between the ring and heat sink.
During the use of the plasma source, the seizing between the ring and spacer might occur. In this case, *do not forcibly remove the spacer* and use it until the replacement time of ring. If you forcibly remove the spacer, it is deformed and cannot be used. Using the deformed spacer causes instability of the plasma beam.

When replacing the filament

Before disassembling the filament assembly,
make sure that the filament assembly is cooled enough.

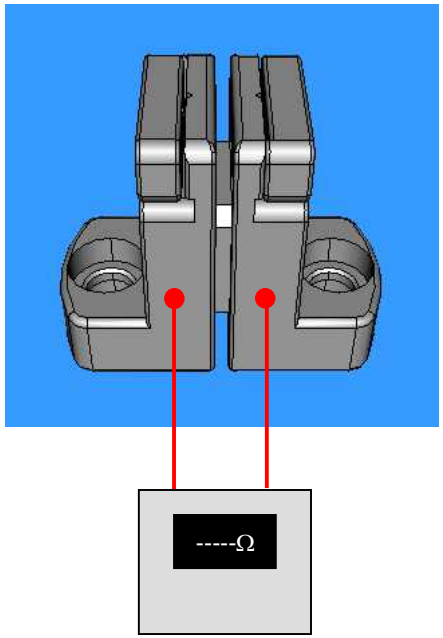


Use a torque wrench. (25Ncm)

If the status of the bolts or the tap section is poor, replace the bolts or perform tap processing. If the equipment is used in such a status, the bolts may not be removable.

When replacing the filament

If the holders and supports are contaminated or membranes are deposited on them, clean them.
For cleaning, use Scotch-Brite／No.7447 made by Sumitomo 3M or equivalent.



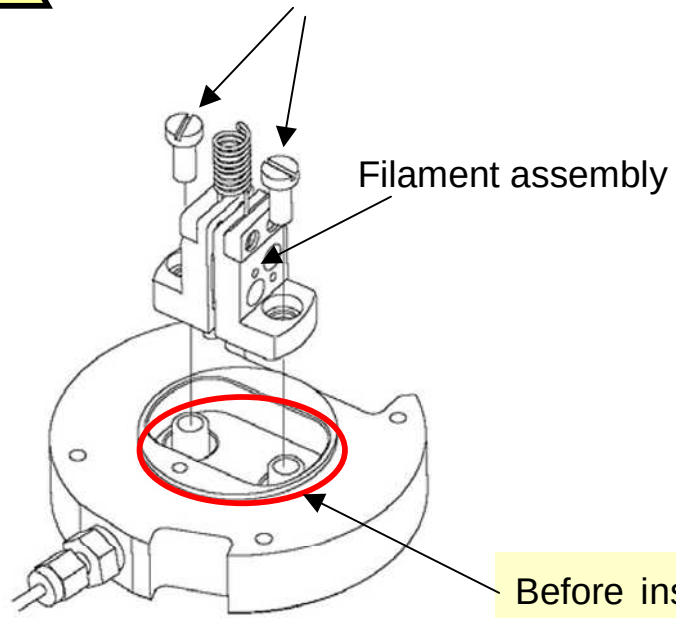
Measure the resistance between the holders *without filament* and check if it is 100 kΩ or greater. If it is less than 100 kΩ, clean the insulator by sandblast.

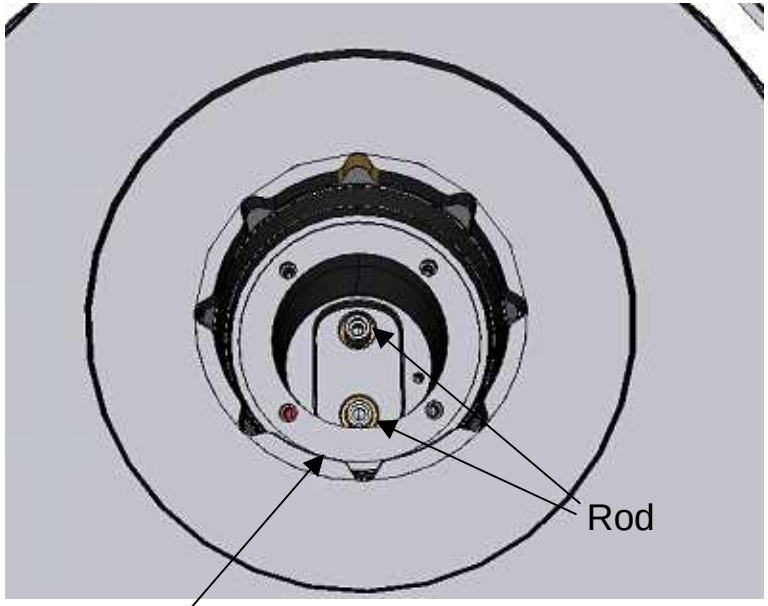
When clean the insulator by sandblast, carry out it lightly. If you do it strongly, the insulator might be damaged.

⚠ To avoid an arcing, wipe out contaminants by immersing alcohol on paper waste or an industrial wiper.

When replacing the filament

Use a torque wrench. (25Ncm)



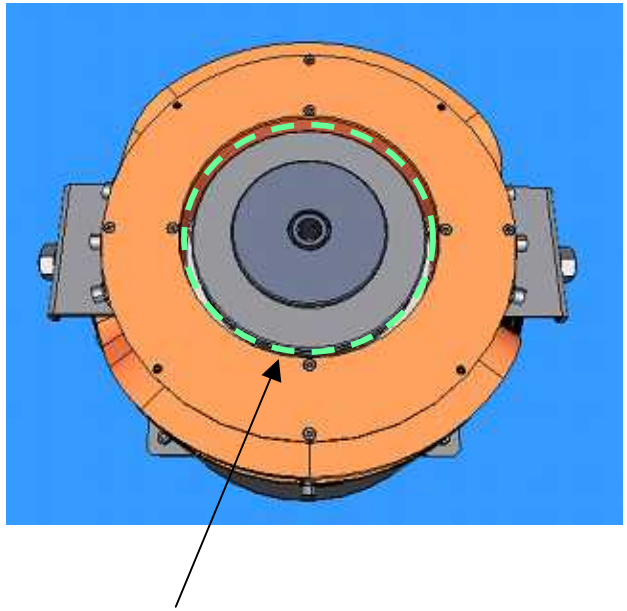


Before installing the filament assembly, make sure that carbon-contaminants or dust do not settle on the flange, especially around the rods. If there are contaminants on the flange, remove them by a vacuum cleaner.

If the status of the bolts or the tap section is poor, replace the bolts or perform tap processing*. If the equipment is used in such a status, the bolts may not be removable.

*M6 threading tap is not included in standard accessories.

Every-month maintenance



If there are contaminants on the insulator, remove them by a vacuum cleaner.

Every-month maintenance

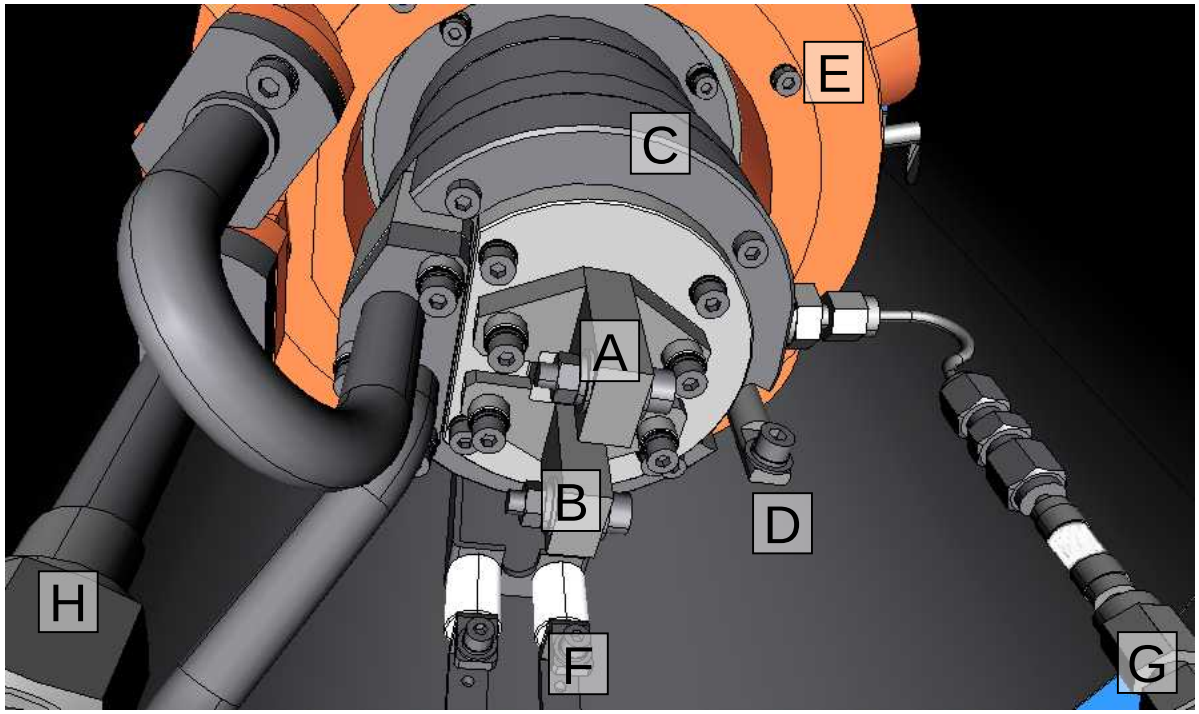
Cleaning of the anode electrode flange

Do not use a wire brush when cleaning.

If the resistance value is more than 0.5Ω or the contamination on the surface of the anode electrode flange is distinctive, clean this section.
For cleaning, use Scotch-Brite/No.7447 made by Sumitomo 3M or equivalent.
For finishing, wipe out contaminants by immersing alcohol on paper waste or an industrial wiper.

Every-month maintenance

Measure the electric resistance of the following items (1)to(9).
Check if the resistance value is 100 kΩ or more.



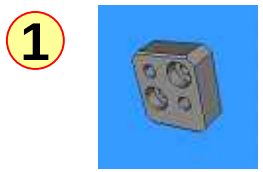
A (filament terminal)
B (filament terminal)
C (flange)
D (anode electrode terminal)
E (coil)
F (coil terminal “+”)
G (1/4-1/8 Union)
H (I-shaped pipe)

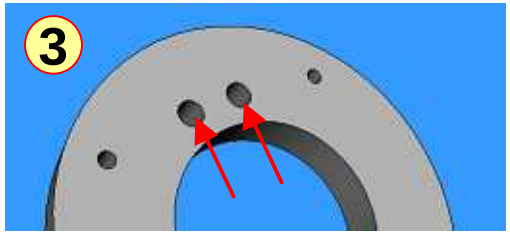
check points
1) A – B*
2) A – C*
3) B – C*
4) C – D
5) C – E
6) D – E
7) E – F
8) C – G

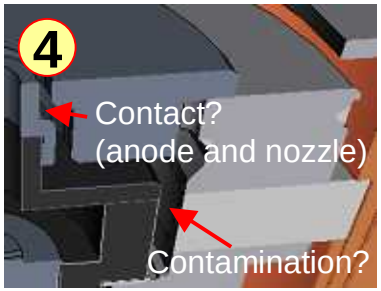
<Note>
Measure the electrical resistance after removing the wires and draining the cooling water from the plasma source .

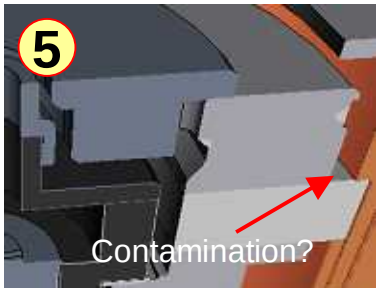
*Without filament

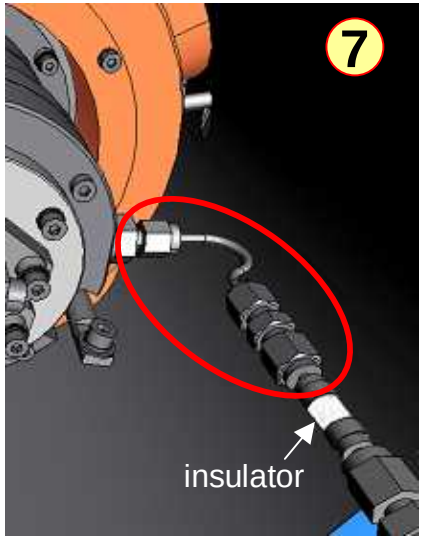
Every-month maintenance











No.	Check point	Possible cause of low resistance (R<100kΩ)	Ref.
1	A-B	Contamination of the insulator (filament assembly)	①
2	A-C	Contamination of the insulator (around the terminals)	②
3	B-C		
4	C-D	Contamination of the insulator	③④
5	C-E	Contamination of the insulator	⑥⑦
6	D-E	Contamination of the insulator	⑤
7	E-F	The coil cable become shorted with ground.	
8	C-G	The gas pipe become shorted with ground.	⑦

Every-month maintenance

Specification of water

Resistivity 5kΩ･cm or more
pH 6.5 to 8

If the quality of the cooling water does not meet the specification, the clogging or corrosion of the pipes might occur.
Periodically inspect the water quality, and if it does not meet the specifications, replace the water immediately.

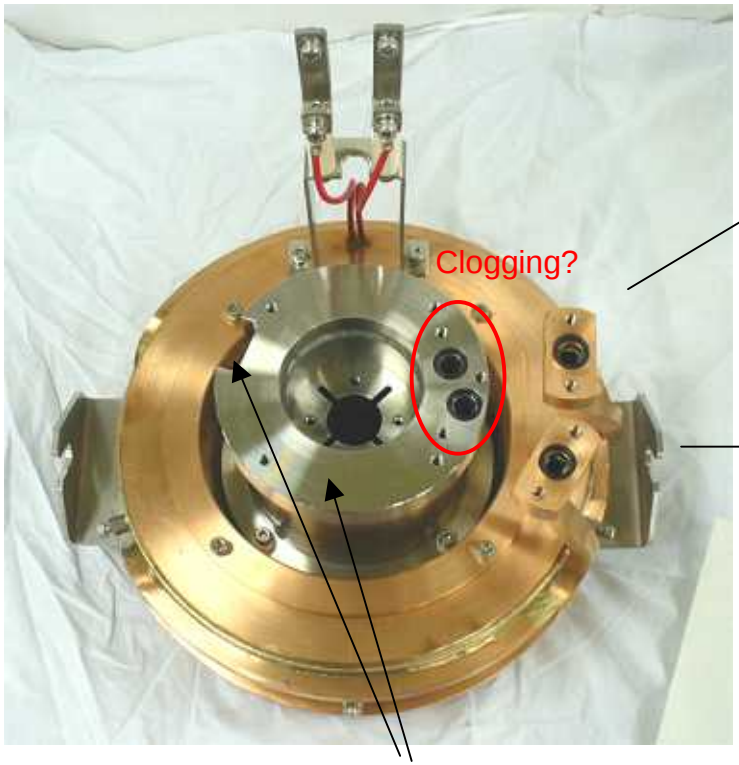
<Recommended specifications for the cooling water>

1) Hardness: 100 mg$CaCO_3$ / L or less
2) Evaporation residue: 250 mg / L or less
3) Chloride: 50 mgCl^- / L or less
4) Iron: 1 mgFe / L or less
5) Sulfate: 50 mgSO_4^{2-} / L or less
6) Silica: 30 mgSiO_2 / L or less

Every-month maintenance

Disassembling and inspecting the water pipes

1) Bypass pipe, insulator and heat sink



Remove filament unit and anode electrode terminal.

Bypass pipe

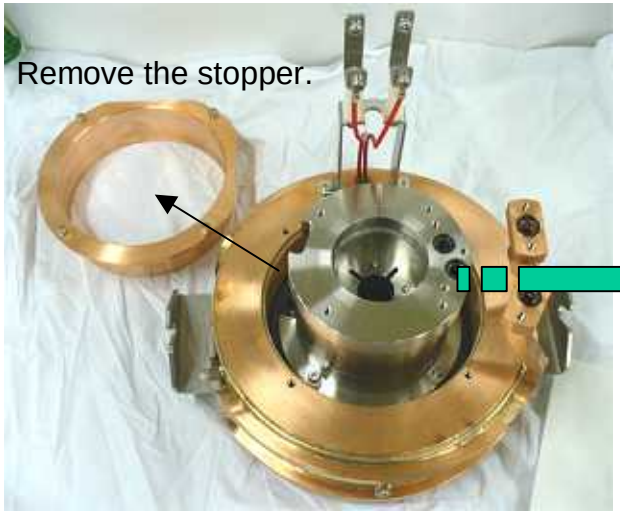
Corrosion?

Bypass pipe insulator

Remove rust and clog

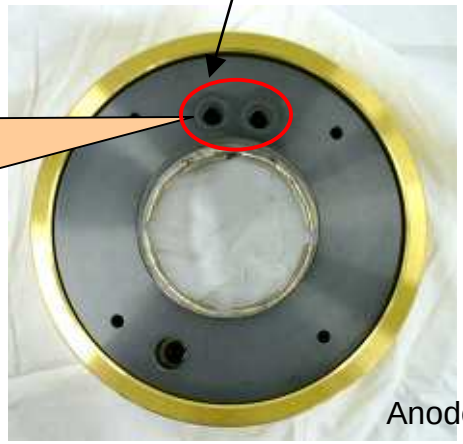
Every-month maintenance

2) the water line between heat sink and anode.

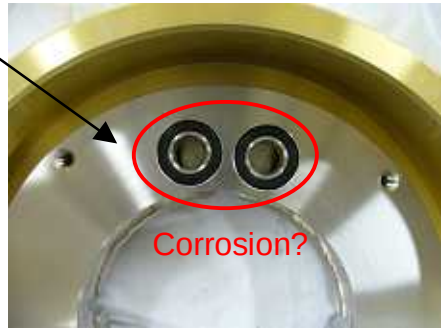


Heat sink

⚠ Do not sandblast O-ring-sealing face.



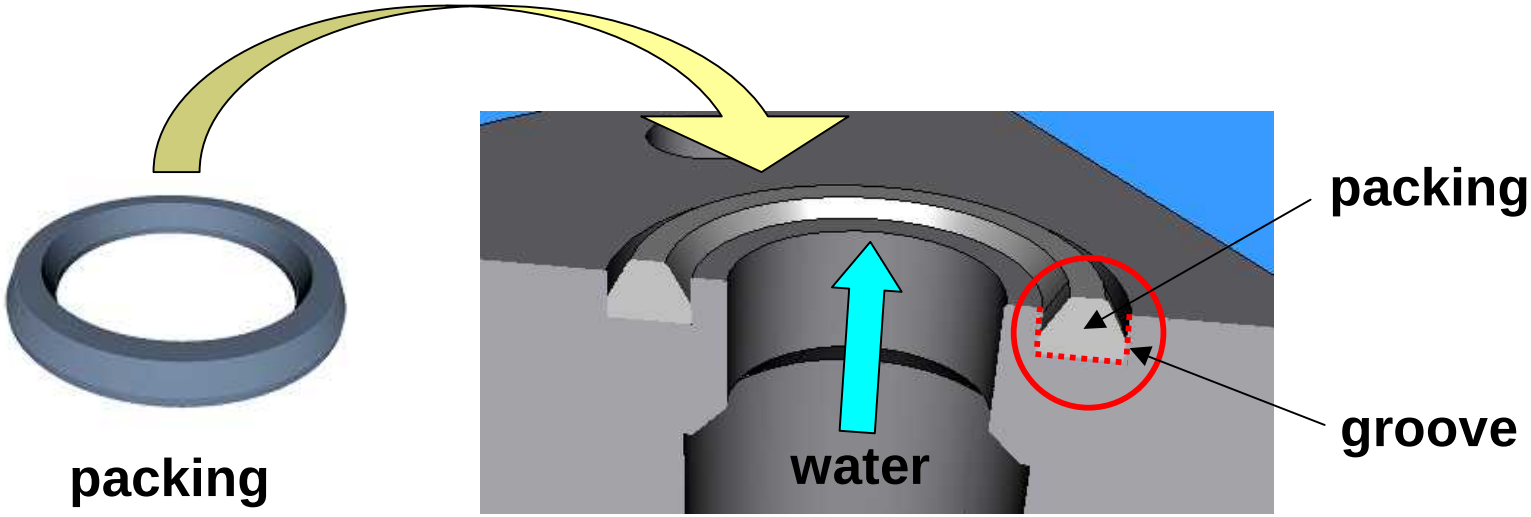
Anode insulator



Anode electrode flange

Every-month maintenance

Be sure to set the packing in the groove and make sure that it is set in a correct direction.

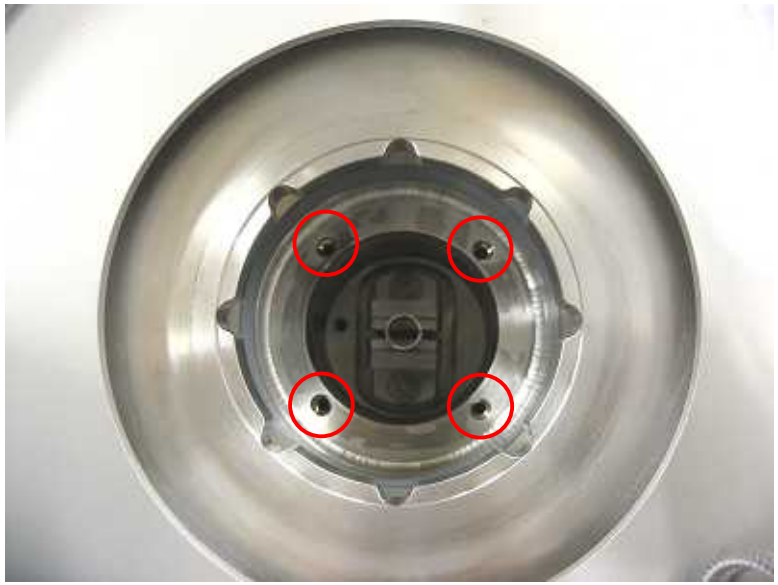


Cross-sectional view of a water pipe

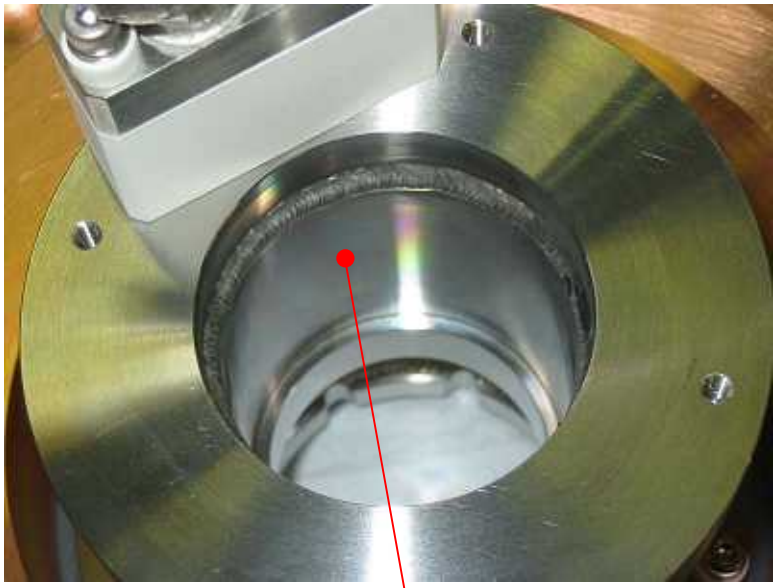
Make sure that the packing and groove are not wet.
Wipe them carefully before you put the packing into the groove.

Every-month maintenance

Inspecting the condition of the heat sink



If the status of the bolts or the tap section is poor, replace the bolts or perform tap processing. If the equipment is used in such a status, the bolts may not be removable.

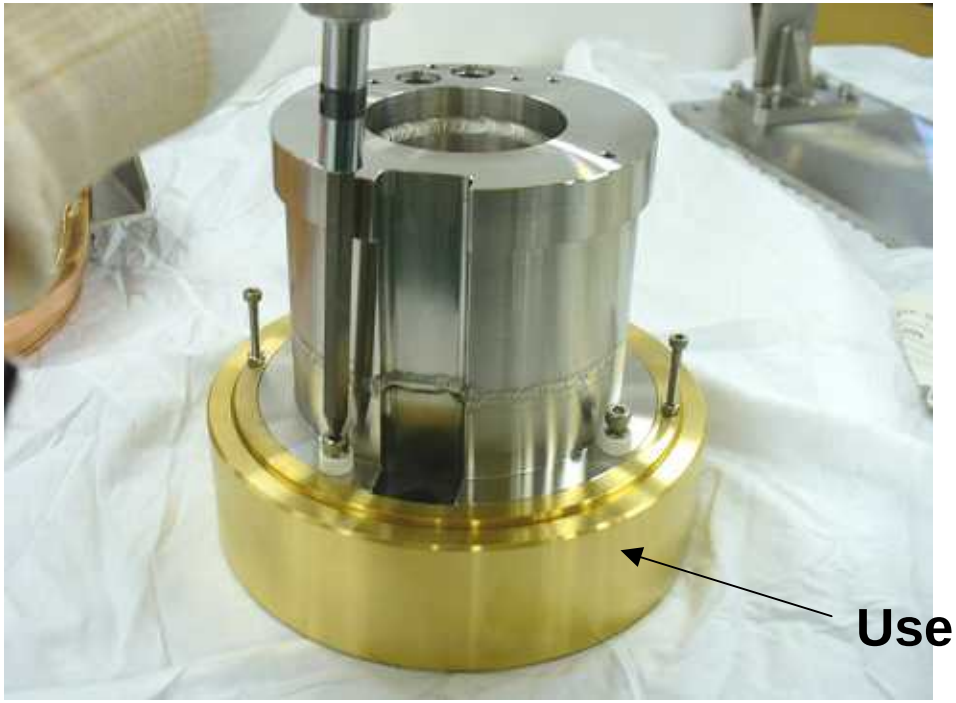


If contaminants are deposited on the surface, carry out cleaning by using Scotch-Brite／ No.7447 made by Sumitomo 3M or equivalent.

Every-month maintenance

Assembling the plasma source

When a torque value is specified in manual, use a torque wrench.



Use the Jig A, B.

Every-month maintenance

Be sure to set the O-ring on the gas pipe joint and make sure that it is not deteriorated.

***Replacement cycle: 6 months**