Meiwafosis

Tennant20

Osmium Coating System

Instruction Manual

Contents

March 2021

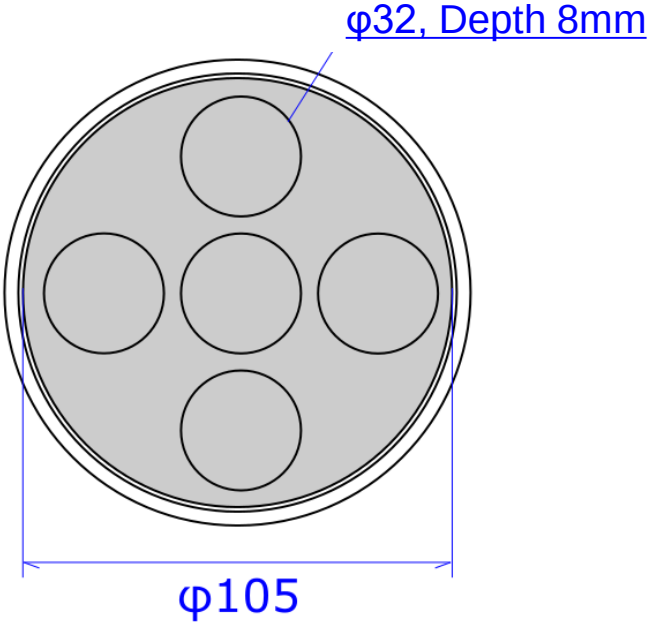
Meiwafosis Co., Ltd.

1. Specifications and Basics

Specifications

Item	Description
Dimensions of Chamber	Φ150x70㎜
Sample Stage: Load Capacity	Φ10㎜x35, Φ15㎜x10, Φ30㎜x5
Bell Jar	Well-Sealed O-Ring Type
Pump Capacity	50ℓ/min
Current Consumption	AC100V Max.10A (including vacuum pump start-up)
Fuse	Glass Tube (Φ6.4 x 30㎜) 15A/10A
Dimensions of Main Unit	390(W)x385(D)x435(H)㎜

Sample Stage (Electrode)

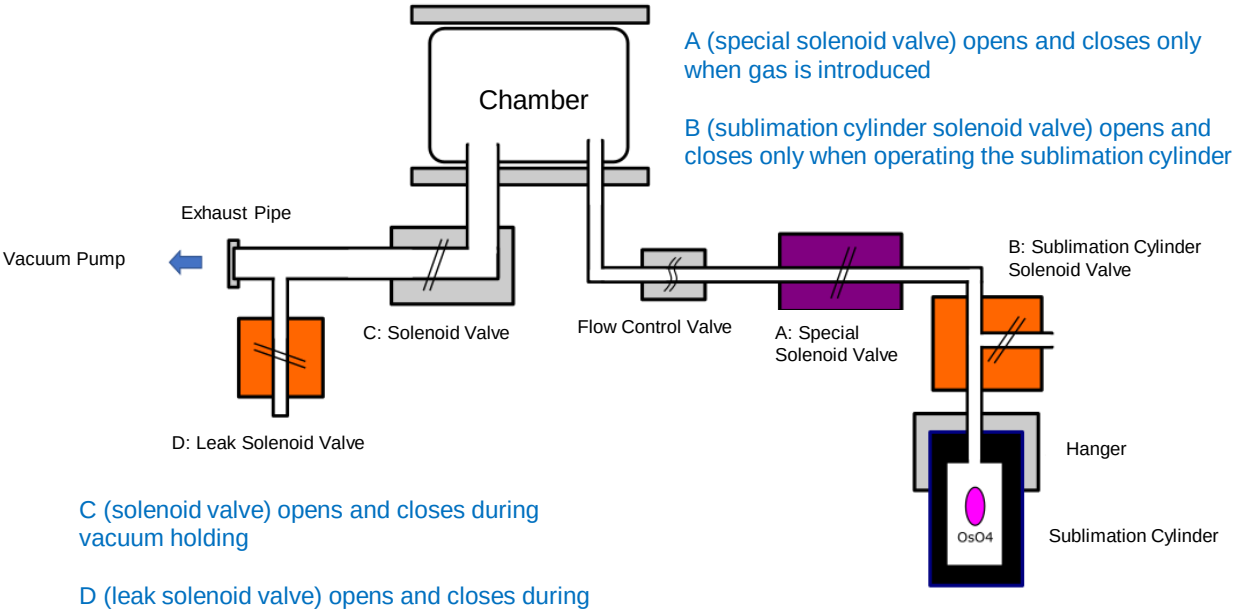


1. Specifications and Basics

Function

Item	Description
Auto Exhaust	Atmospheric replacement of gas in chamber (Vacuuming 30 sec/Pump stop 10 sec x 3 times)
Current Value Setting	0.1 to 20.0mA (Current limit is 30 mA max.)
Film Thickness Setting	0.0 to 30.0nm
Auto	Automatic operation after entering film thickness value Vacuuming: ～2Pa Gas Filling: 10 sec
Manual	Coating time, current value, and gas filling time can be set as desired
EJECT	Forced Exhaust: 180 sec
INSERT	Forced Exhaust: ～2Pa
Finish	Forced Exhaust: ～2Pa
Ampule Replacement	Forced Exhaust: ～2Pa ＋ 30 sec

Channel Block



A (special solenoid valve) opens and closes only when gas is introduced

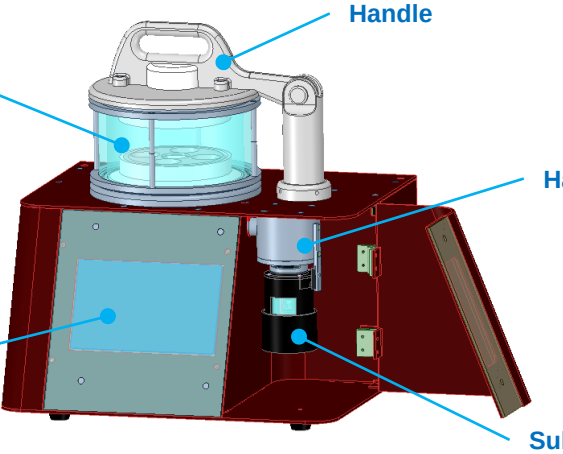
B (sublimation cylinder solenoid valve) opens and closes only when operating the sublimation cylinder

C (solenoid valve) opens and closes during vacuum holding

D (leak solenoid valve) opens and closes during air displacement and vacuum holding

1. Specifications and Basics

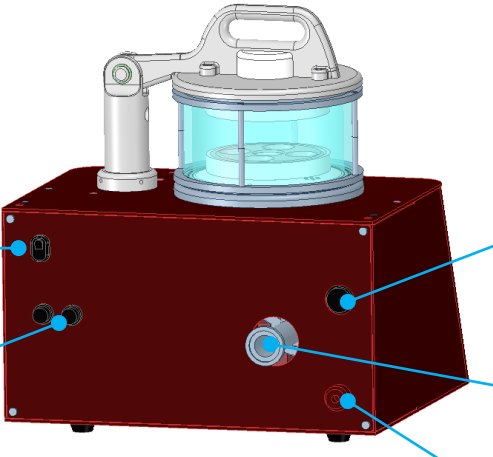
Front



Details
→page 7

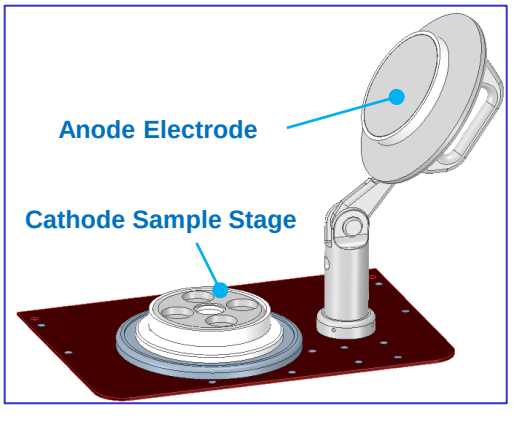
Ampule replacement
→page 15

Back



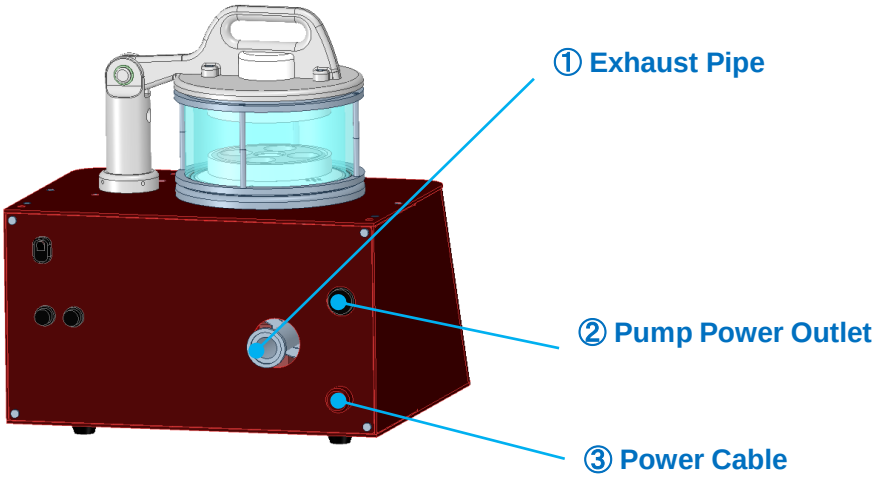
Refer to Specifications for ratings
→page 2

Inside of Chamber



Cleaning
→page 21

1. Specifications and Basics



1. Connect the main unit and the vacuum pump with flexible tubing and clamps.

※ Tighten the clamp screws firmly. Loose screws may cause leakage.

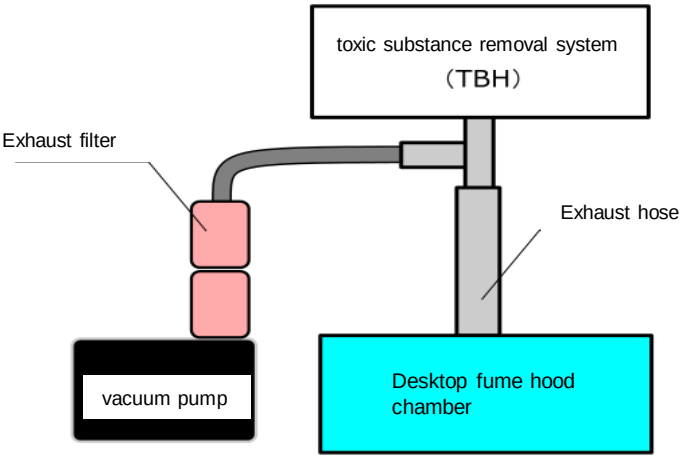
2. Connect the power cable of the vacuum pump to the pump power outlet on the unit.

3. Plug the power cable of the osmium coater into a power outlet (100V).

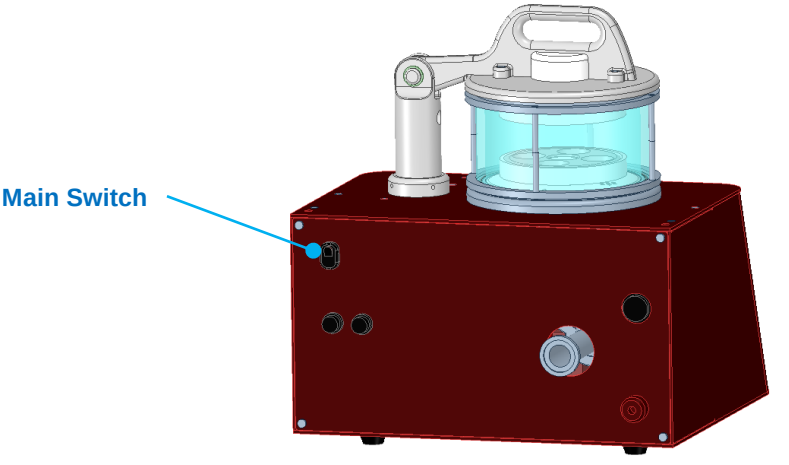
4. Install the exhaust hose of the vacuum pump in a fume hood.

Alternatively, open the window and pull out the hose to prevent the gas from being exhausted into the room.

* If you have purchased our toxic substance removal system, connect an exhaust hose to its adapter.

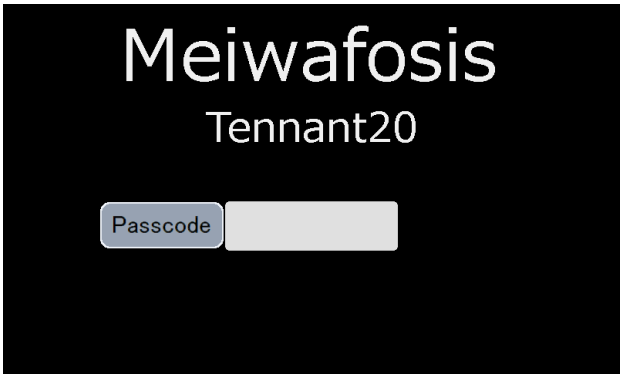


2. Operation Screen



Turn on the "main switch" on the back to turn on the operation panel.

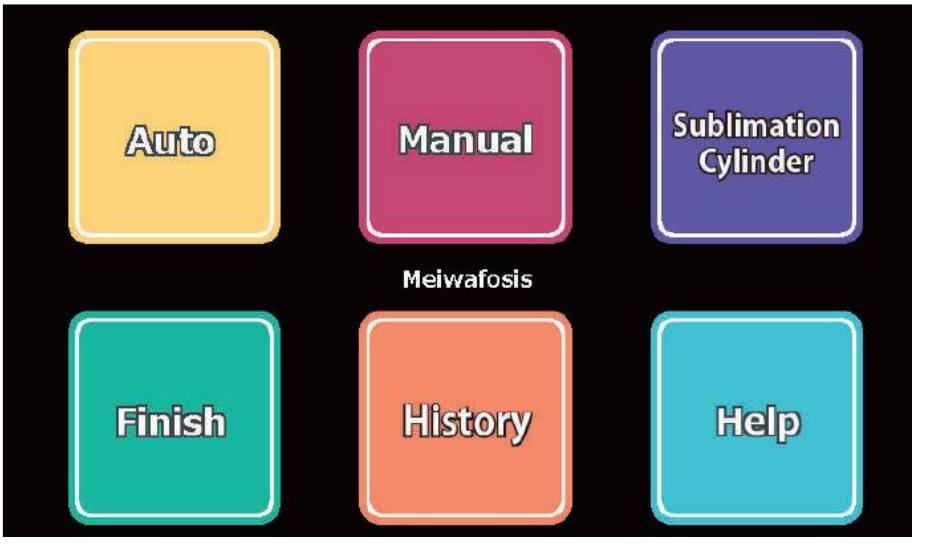
After the screen lights up, the login screen shown below will appear.



*Default passcode: 0000

2. Operation Screen

There are six options on the main screen.



・**Auto**

The whole procedure is automated. It just requires entering a film thickness.

・**Manual**

Coating can be performed by manual operation.

Set a current value and a coating time, and start suction, gas filling, and coating as desired.

・**Sublimation Cylinder**

It controls the installation and removal of the sublimation cylinder.

・**Finish**

It ends operation, holding vacuum and shutting down the device.

・**History**

It records the history of operation.

・**Help**

It contains troubleshooting, contact information, date/time setting, and passcode setting.

3. Operation

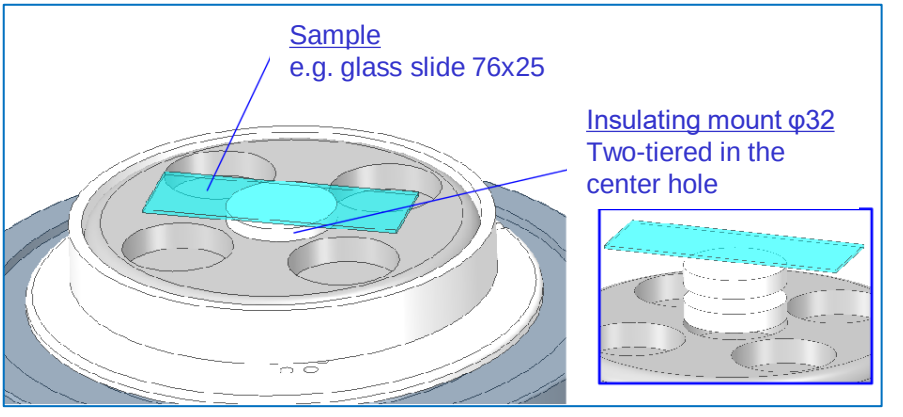
How to set a sample

Place a sample on the attached insulating mount (Teflon cup).

*If it cannot be placed correctly, use a commercially available Teflon sheet.

A sample larger than the diameter of the insulating mount or with an area larger than the insulating mount

Place two insulating mounts over the hole in the center of the stage and place a sample on top.



How to fix a powder sample

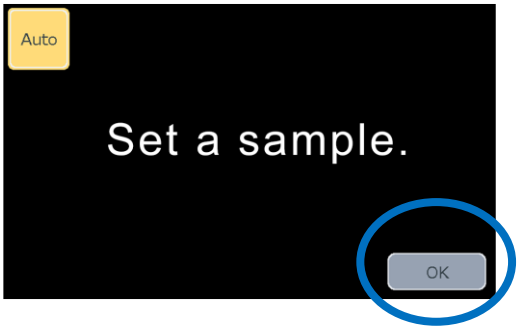
If the sample is powdery and easily scattered, we recommend attaching a commercially available carbon tape for SEM on the SEM sample stage to fix it in place.

*This will prevent scattering when you move the sample or open/close the lid.

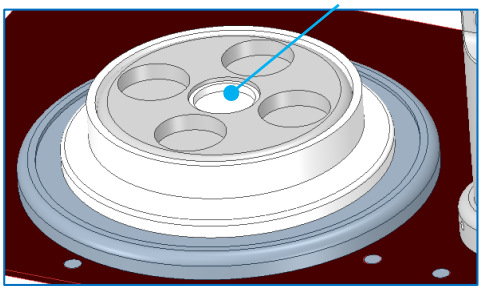
3. Operation

Auto

Follow the instructions.



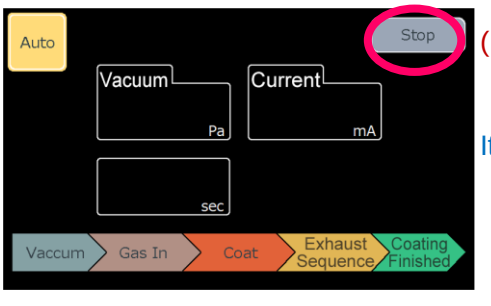
Cathode sample stage



Place a sample on the attached insulating mount (Teflon cup).
*If it cannot be placed correctly, use a commercially available Teflon sheet.

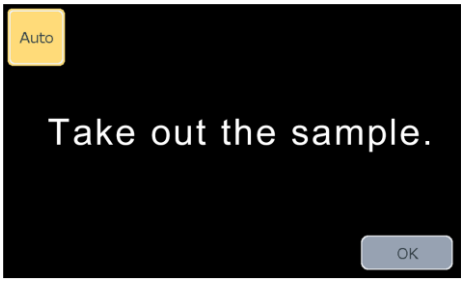
Close the lid.

After setting a film thickness, press Strat to start coating (close the chamber lid).



(Press Stop to end the operation)

It displays the status of the coating in progress.



Press OK when the sample is removed.

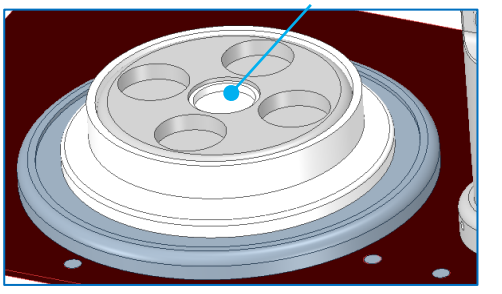
3. Operation

Manual

Follow the instructions.

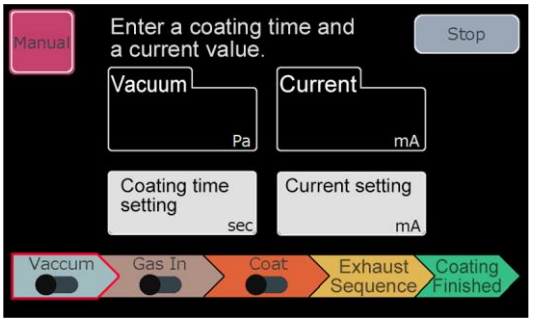
Cathode

sample stage



Place a sample on the attached insulating mount (Teflon cup).

*If it cannot be placed correctly, use a commercially available Teflon sheet.

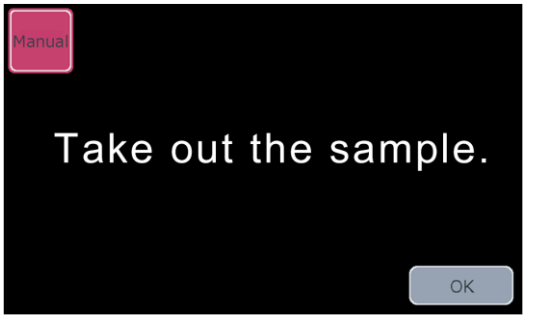


Close the lid.

After setting the current value and coating time, slide “Gas In” to fill the chamber with gas and perform coating.

Each status is displayed until the operation is completed.

(Press Stop to end the operation)

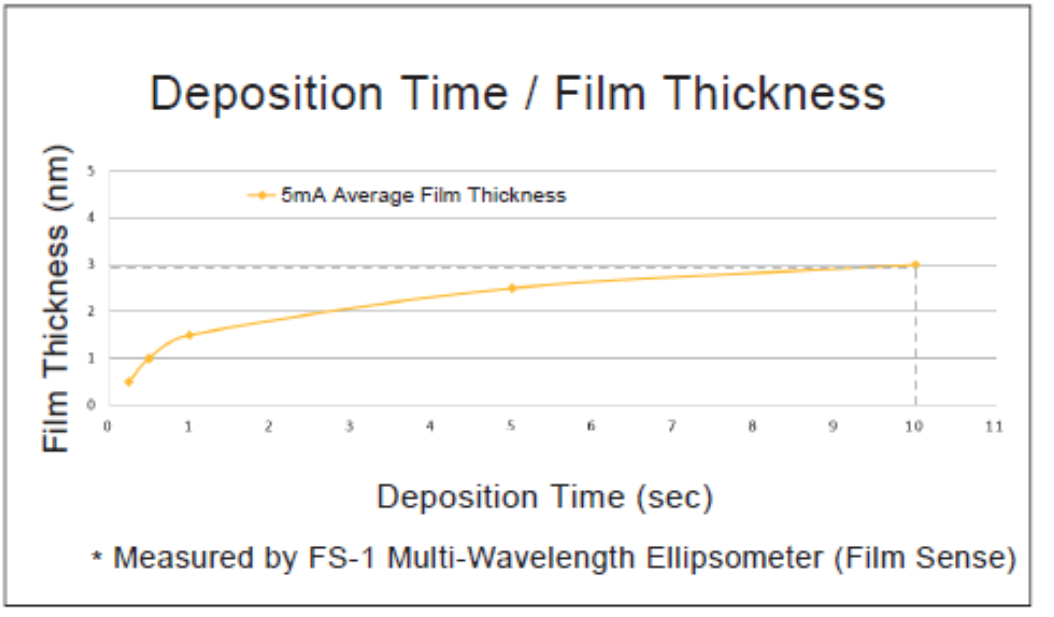


Press OK when the sample is removed.

2. Confirmation of deposition conditions

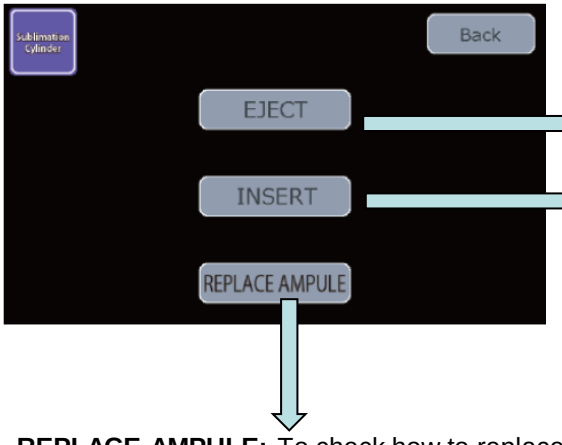
The amount of osmium deposition is proportional to **current (mA) x discharge time (seconds)**.

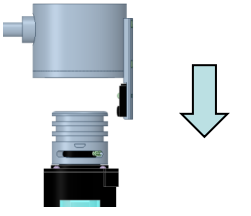
Discharging at **5mA** is recommended.



3. Operation

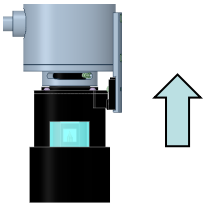
Sublimation Cylinder



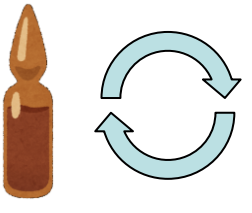


EJECT: To remove the sublimation cylinder

INSERT: To install the sublimation cylinder



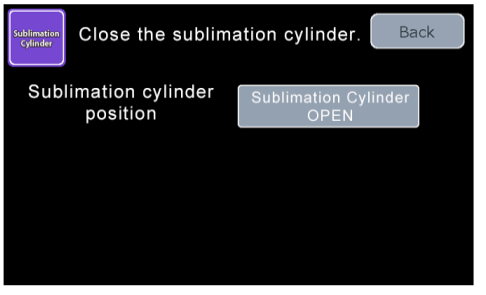
REPLACE AMPULE: To check how to replace the ampule

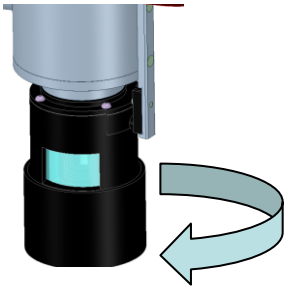


3. Operation

EJECT

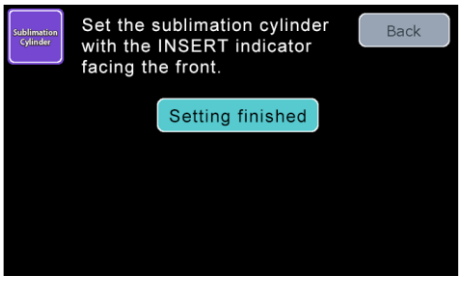
Follow the instructions.

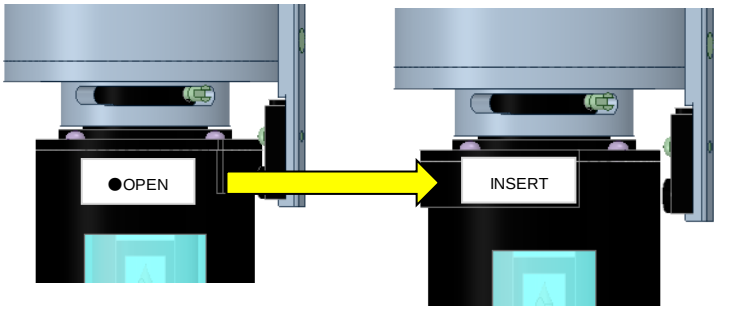




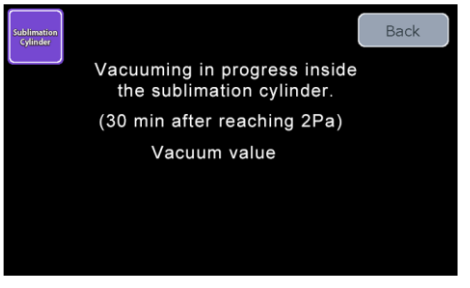
The sublimation cylinder can be closed by turning it 180˚.

OPEN→INSERT

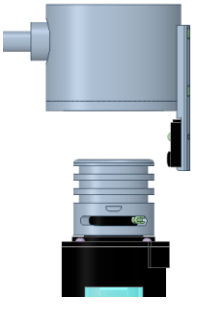




Vacuuming starts when the sublimation cylinder is closed (INSERT indicator facing front).



When the exhaust operation is completed, remove the sublimation cylinder following the instructions on the screen.

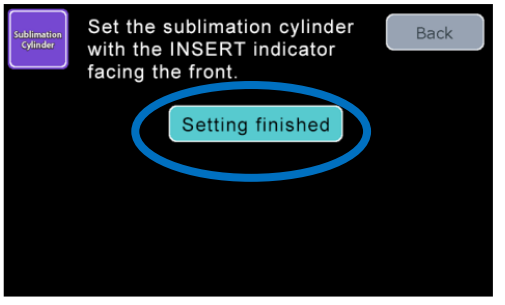


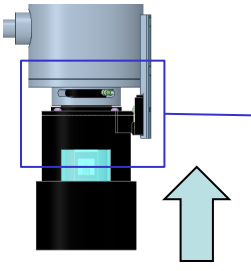
Pull it down to remove it.

3. Operation

INSERT

Follow the instructions.



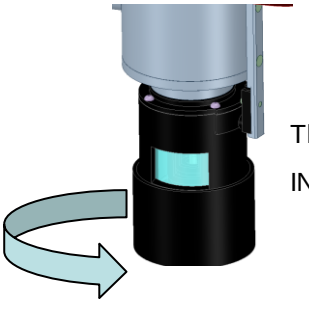


INSERT indicator facing front

INSERT

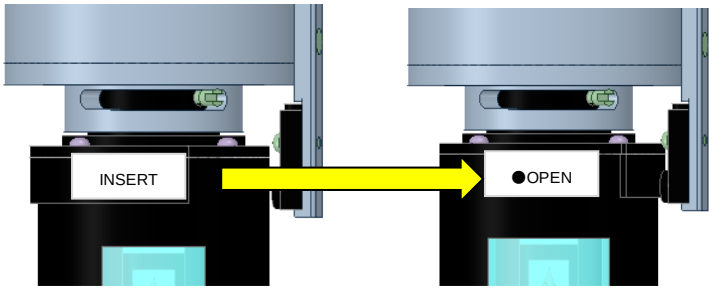
After setting, Start

After vacuuming is done, rotate the sublimation cylinder to the OPEN side.



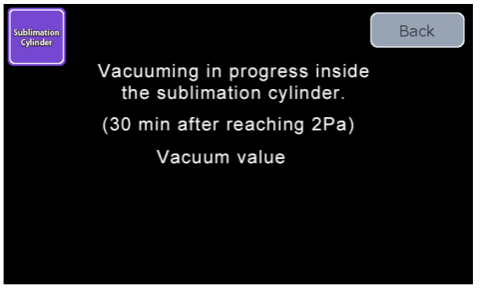
The sublimation cylinder can be opened by turning it 180°.

INSERT→OPEN



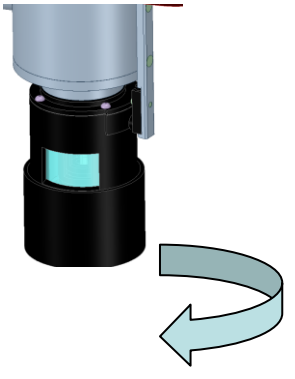
4. Ampule Replacement and Sublimation Cylinder Handling

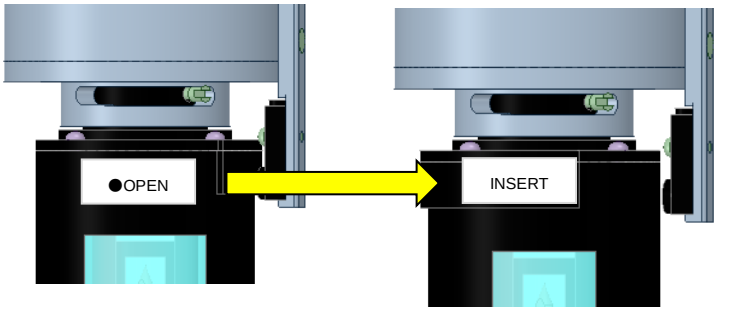
Select REPLACE AMPULE, and follow the instructions.



First, suck out the residual gas in the sublimation cylinder.

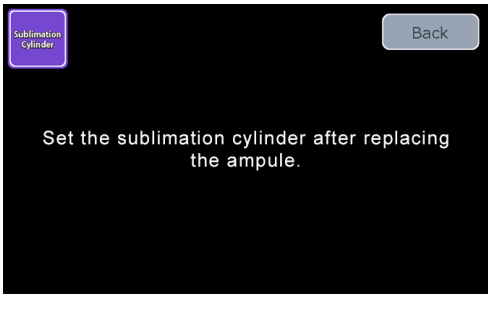
Close the sublimation cylinder when suction is finished.

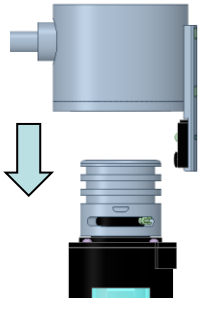




The sublimation cylinder can be closed by turning it 180°.

OPEN→INSERT





Remove the sublimation cylinder and replace the ampule.

4. Ampule Replacement and Sublimation Cylinder Handling

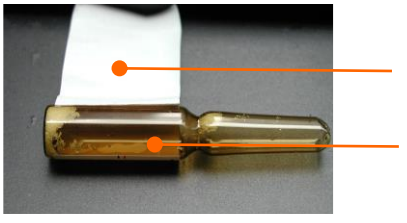
・Wear gloves when handling the ampule.

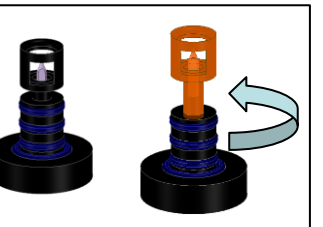
・If an empty osmium ampule remains in the sublimation cylinder, discard the internal debris before you start replacing it with a new ampule.

Prepare osmium ampules.

Remove the label on the ampule and wipe the surface with ethanol.

*Sebum and adhesive buildup may cause slow vacuuming.



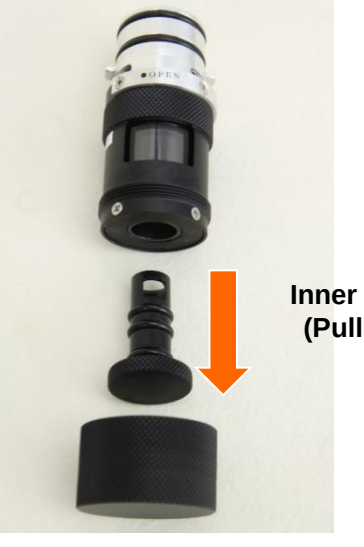


The height of the needle can be adjusted if the ampule is too short.

・Remove the outer cap and inner stage of the sublimation cylinder.

Sublimation Cylinder

Outer Cap (Turn and open)



Inner Stage (Pull Out)

4. Ampule Replacement and Sublimation Cylinder Handling

・Insert the ampule as shown in the photos.

・Gently insert the inner stage.

*When the sublimation cylinder is gently shaken sideways, there should be a gap that allows the ampule to rattle slightly.

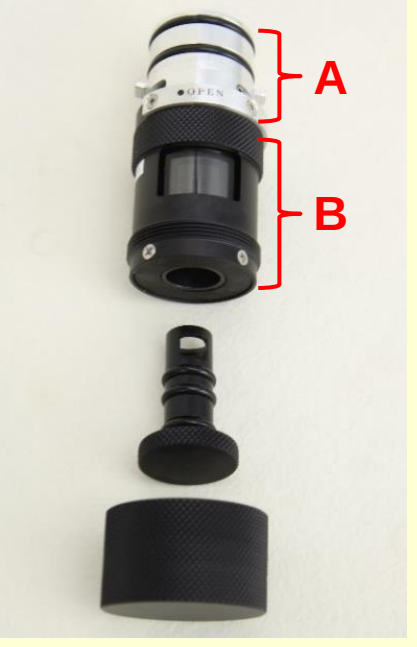
Note) **At this point, the ampule should not be broken. Please be careful not to insert the ampule too deeply as it will break.**

・Tighten the outer cap lightly enough so that it does not fall out of the sublimation cylinder.

Note) **At this point, the ampule should not be broken. Please be careful not to overtighten as the ample will break.**

4. Ampule Replacement and Sublimation Cylinder Handling

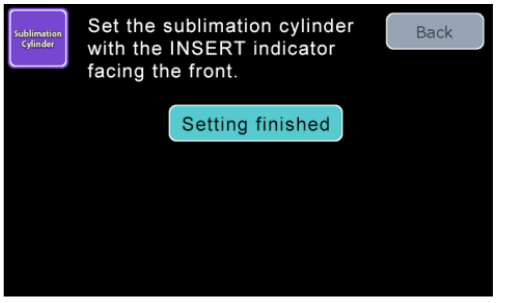
If the inner stage of the sublimation cylinder cannot be pulled out due to vacuuming when an ampule is replaced:

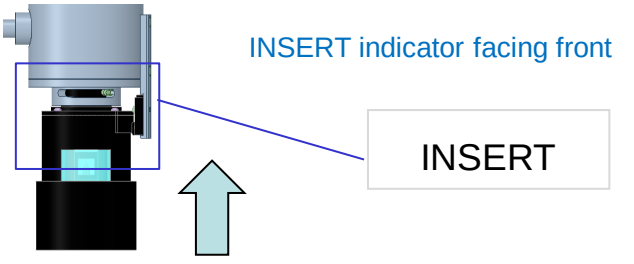


① Hold part **(A)** of the sublimation cylinder with one hand and part **（B）** with the other hand.
② By turning both hands in different directions to OPEN the hole in the inner stage, the vacuum in the sublimation cylinder is broken, allowing air to enter and enabling the inner stage to be pulled out.
③ After installing the ampule, turn the inner stage back to CLOSE in the opposite direction of ② before using the ampule.

4. Ampule Replacement and Sublimation Cylinder Handling

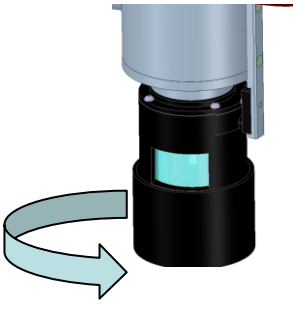
Follow the instructions.





After setting, Start

After vacuuming is done, rotate the sublimation cylinder to the OPEN side. It is OK if the cap is loose. Wait until vacuum is stable (around 2Pa), close the sublimation cylinder, and then crack the ampule.



The sublimation cylinder can be opened by turning it 180°.
INSERT→OPEN

・Slowly turn the outer cap of the sublimation cylinder and stop when you feel the "click" of the ampule breaking.

Note）Stop rotating the outer cap when the ampule breaks.

Over-tightening of the outer cap may cause excessive stress on the glass part during vacuuming, resulting in breakage of the glass part or damage to the O-ring due to fine debris from the ampule.

4. Ampule Replacement and Sublimation Cylinder Handling

Overhaul of Sublimation Cylinder

Recommended Frequency:

Once every 6 months or once after 5 ampule changes.

Details:

・Replacement of O-rings: O-rings are used to maintain a vacuum. Periodic replacement is recommended to prevent vacuum leakage due to aging deterioration or damage from glass debris.

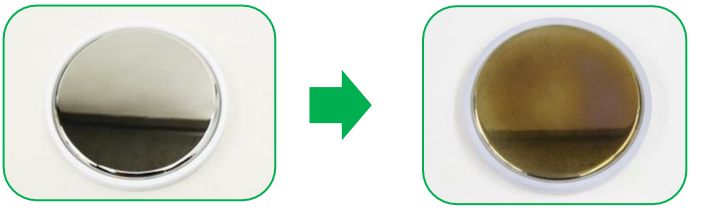
・High vacuum grease: It is applied to the O-rings to maintain a vacuum.

5. Cleaning

Cleaning guidelines

Continued use without cleaning may cause discharge at a higher current value than the targeted current value or cause the discharge to be unstable.
The following are basic cleaning procedures for maintaining the Tennant20 to ensure proper function.

Cleaning guideline：When replacing Os ampule



When the silver electrodes become stained in golden brown, it is time for cleaning.

Precautions for cleaning procedures

・If sebum from your hands adheres to the parts in the chamber, vacuuming may become slow. Be sure to wear gloves when working.
・If the electrodes are damaged, discharge may become unstable. Handle the electrodes with care to avoid dropping or damaging them.
・Do not strip the screw holes when attaching or detaching the electrodes.
If the screw holes become stripped, removal of the electrodes may not be possible.

What to prepare

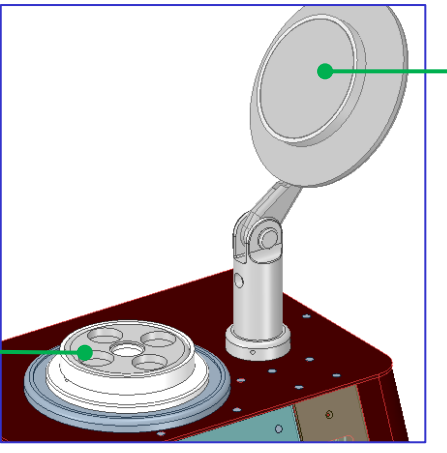
・Solution containing sodium hypochlorite*
・Vacuum grease
・Kimtowel
・Melamine sponge
・Rubber gloves
・Phillips screwdriver

*Some solutions may contain surfactants which are difficult to clean and remove completely. The remaining surfactants may interfere with the discharge. Use the solution that does not contain surfactants.

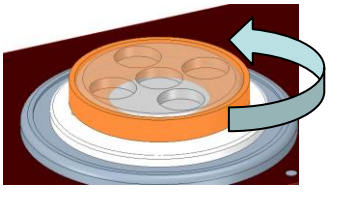
5. Cleaning

Cleaning area

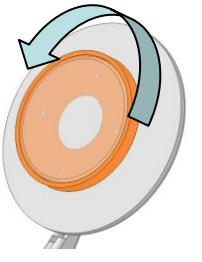
Follow the cleaning procedure shown below.



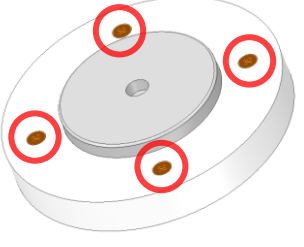
Cathode sample table

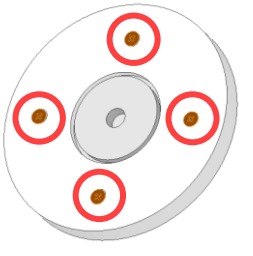


Anode electrode



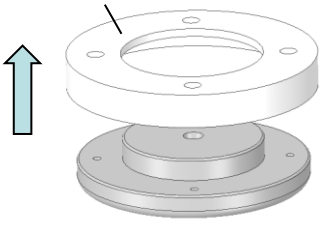
Remove the electrode by turning it to the left.



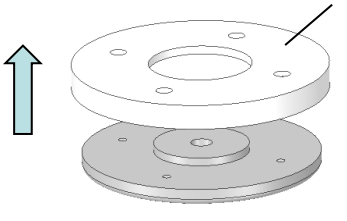


Remove the screws on the back side.

Cathode cover



Anode cover



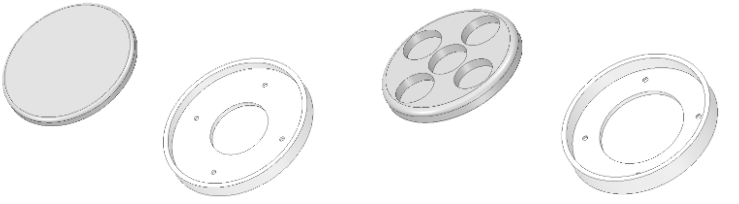
Remove the covers.

5. Cleaning

2. Cleaning Procedures

Clean the following parts according to the procedure.

- **Anode electrode**
- **Anode cover**
- **Cathode sample stage**
- **Cathode cover**



① Wipe and wash each part with a melamine sponge moistened with sodium hypochlorite.

Wipe them until osmium metal is removed.

② Wash each part with water.

*If sodium hypochlorite cannot be flushed down the sewage due to facility regulations, wipe thoroughly with a Kimtowel moistened with water.

③ Dry them thoroughly with a Kimtowel so that no water remains on the parts that have been rinsed with water.

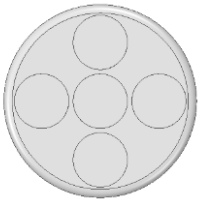
④ Use a blower or air duster to blow out the water in the screw holes and other places that a Kimtowel cannot reach.

*If moisture is left on the parts, it may cause slow vacuuming.

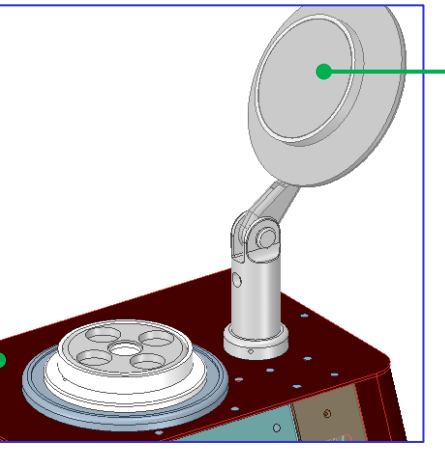
⑤ Wipe each part with a Kimtowel moistened with ethanol to remove residual moisture.

After cleaning, install the cover and fix it in its original place.

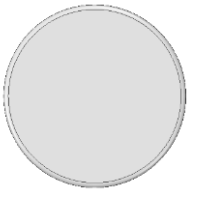
Surface: 5-hole type



Cathode sample stage



Anode electrode

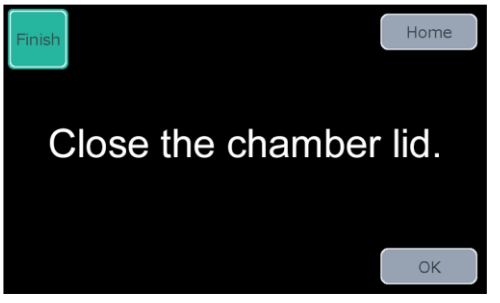


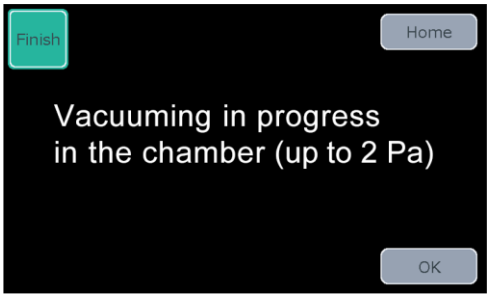
Surface: Flat

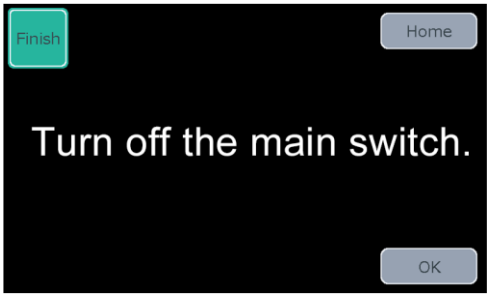
6. End of Operation

Finish

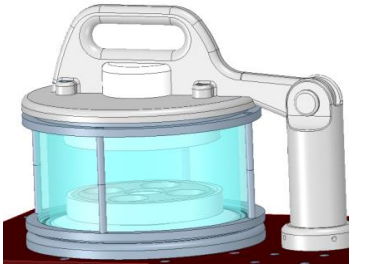
Follow the instructions.

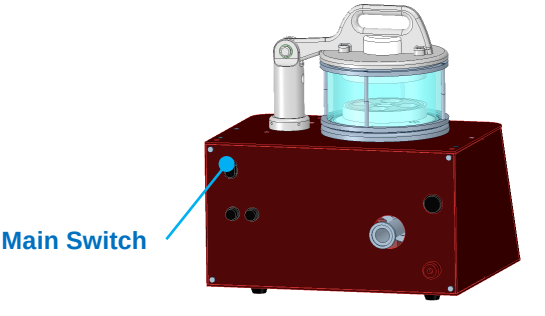






Close the lid.

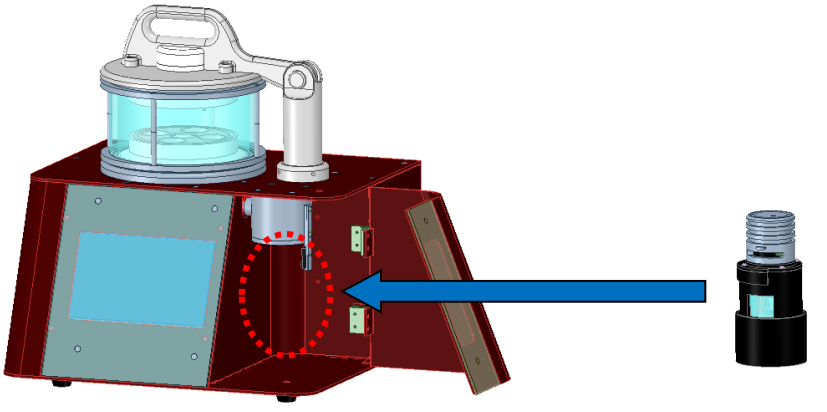




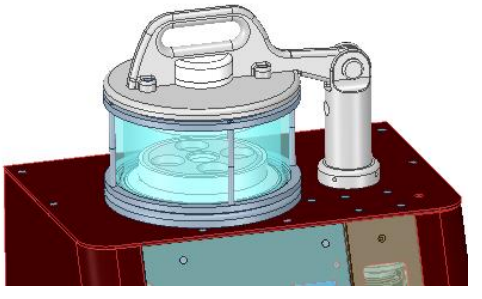
Turn the main switch OFF to stop.

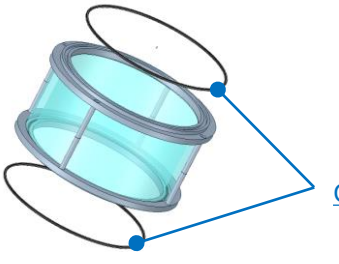
Q. No vacuum is drawn.

A1. Make sure the sublimation cylinder is set on the hanger.



A2. Make sure that the top and bottom of the glass bell jar are tightly sealed, and that the O-rings are greased.





O-rings

Q. No coating can be done even if gas is introduced.

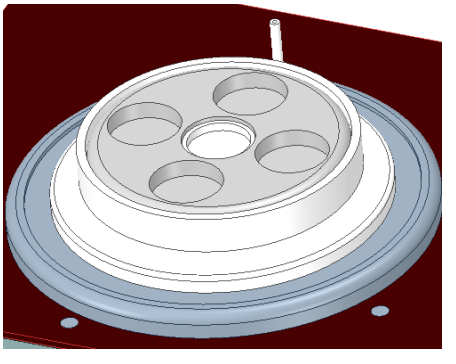
A1. The crystals in the osmium ampule may not be sublimated due to the low temperature, and the gas supply may be insufficient. If it has been stored in a refrigerator, leave it at room temperature for 30-60 minutes (20℃ or higher) before use.

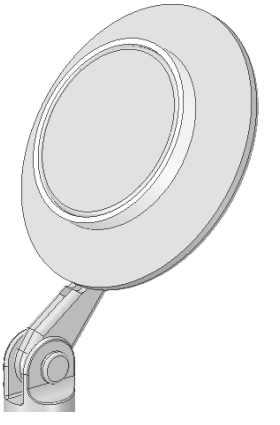
A2. If the remaining gas in the sublimation cylinder is not sufficient, the recommended value will not be reached. Replace the ampule.

Q. Discharge is not stable.

A1. After cleaning, the remaining sodium hypochlorite or ethanol used in the cleaning process may affect the discharge and destabilize it.

A2. Excessive deposition of osmium on the anode and the cathode may cause over-discharge. Clean the electrodes and the inside of the chamber.





Printing History

Publication Date	Changes
A February, 2021	First Edition

Meiwafosis Co., Ltd.

Tokyo TEL:**(03)5379-0051** FAX:(03)5379-0811 Email:infot@meiwanet.co.jp

Osaka TEL:**(06)6674-2222** FAX:(06)6674-2323 Email:infoh@meiwanet.co.jp

Nagoya TEL:**(052)686-4794** FAX:(052)686-5114 Email:infon@meiwanet.co.jp

Sendai TEL:**(022)218-0560** FAX:(022)218-0561 Email:infos@meiwanet.co.jp

Please feel free to contact our sales staff with any problems or questions you may have.
We will be happy to provide you with maintenance services.