Usage Policies Notebook for Ushio Inc. 172nm Photo Bonding System (SUS504B)

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INRF UCIrvine

Hazards and Emergency Information for the Ushio Bonder

Contact information

Person	Phone number
Lab Manager	Jake Hes, 562-522-8328
Director	G.P. Li, 949-824-4194 (day), 949-824-2047 (alternate)
Staff	Steven Martinez, 949-343-1800

Hazardous chemicals, gases, and conditions

Hazard name	Description of hazard
High temperature	Burn or ignition source
High voltage source	Electrical shock, ignition
Isopropyl alcohol solvent	Flammable
N_2(nitrogen)gas	Asphyxiant
Ozone generation	Approx. 8mg/min when the lamp is turned on Strong oxidant and may accelerate, even initiate combustion, or cause explosions Distinctive pungent odor Skin and Eye irritant Respiratory Systemic Toxicity Acute Aquatic Toxicity
UV light	Energized UV discharge lamps are photosensitizing Skin and Eye Hazard
Pinch Point Hazards	Mechanically moving objects could pinch/crush objects or body

Alarms or indications of danger

Alarm type	Condition and responses
Pungent or foul smell	Ozone generation possible. Shutdown the machine at once and evacuate the area. Contact staff and the lab manager.

Emergency Shutdown Plan #1

In the event of an emergency, when there is very little time, turn off the lamp by setting the lamp's POWER switch to OFF. This will shut off the irradiation lamp. Leave the facility at once. Then contact the lab manager or staff.

Emergency Shutdown Plan #2

In the event of an emergency, when there are a few minutes available, turn off the lamp by setting the lamp's POWER switch to OFF. This will shut off the irradiation lamp. Set the power switch of both the bonding unit and power supply to the off position. Leave the facility at once. Then contact the lab manager or staff.

Usage Policies for Ushio, Inc. 172nm Photo Bonding System (SUS504B)

Standard policies for usage

The Ushio, Inc. Bonder is a 172nm Photo Bonding System equipped with a UV lamp with an emission wavelength center at 172nm. This system irradiates an object with 172nm light for a specified period of time. Objects to be irradiated can be joined and bonded on top of each other and pressurized using the bonding unit.

The work setting up, aligning, and joining the objects are performed manually. The irradiation time can be adjusted by changing the timer setting. The pressurizing force can be adjusted during pressurization. The irradiation distance can be adjusted by changing the stage spacer for the thickness of the object to be irradiated. The objects can be heated during pressurization.

Contact information

The INRF staff or the lab manager may be reached at 824-8239 or 824-9831.

Authorized users

Only INRF registered users who have completed the training and passed the certification may use this equipment. Users may only use the portion of the system for which they have been trained.

Training

Users must have received direct training from the staff in order to use this equipment. Contact the staff for details and to arrange a training session.

Usage logs

Users are required to log all activity in the log sheets provided. All users must log in when they use the Ushio system. If users notice anything unusual, they should record it in the user log sheets.

Safety equipment

There is no specific safety equipment required for use on this tool; however, cleanroom gloves and tweezers should be used when handling pieces on the unit. Care should be taken to avoid burns when working near the heated surfaces.

Scheduling

Reservations can be made online. If no reservation was made, the system can be used on a first come, first served basis.

Other issues

Users should remain physically present in the cleanroom facility during the entire use of the Ushio system. This includes the time when the heated surfaces are warming up.

Users should not modify any standard set points.

At no time should a user adjust a pressure regulator on a gas line. Gas control should be “on” or “off” only, using only the valves appropriate.

Non-standard use

Users may not modify any hardware on this equipment. For use of non-standard processes, gases or materials, contact the staff or the lab manager.

Standard Operating Procedures for the Ushio, Inc. 172nm Photo Bonding System

**If anything doesn't go according to plan, procedure, or training, stop and contact staff*

A. Check the status of the system, ensure it is in proper idle state, and start your session on the Forged system

The first step before beginning to operate the tool is to check the status of the system. Check the following and ensure that the system is in its proper idle state.

1) Confirm the system is currently up, and online for use. Verify this by checking the Forged system equipment status page and reviewing the recent history of updates for the tool. Ensure the tool is in an "Online" state. Review the log book and recent use of the tool for any relevant comments or indications.
2) Confirm the system is not currently in use or tagged out by staff. Verify this, in addition to the last step, by reading and following any signs posted on or near the tool. Look for any sign of a previous user not yet finished with the tool. Verify from the Forged system that the tool isn't reserved or in use by another user.
3) Confirm that the tool is in its proper idle state and everything looks normal and ok (tool training and experience will give you the skills to do this).

Ensure the System is in Proper Idle State:

- ❏ The power supply (red transformer) below the table should be off.
- ❏ The nitrogen (N_2) should be off and reading 0 psi on both pressure dials (DO NOT ADJUST THE REGULATOR).
- ❏ The clean dry air (CDA) in the chase should be off (orange ball valve closed and regulator reads 0 psi (DO NOT ADJUST THE REGULATOR)).
- ❏ The 3 switches on the bonding unit should down and in the OFF or DOWN positions.
- ❏ The Excimer Photon Source Power supply should be OFF.
- ❏ The Heater Controller / Temperature Controller should have both power switches OFF for the suction and pressurizing tables.
- ❏ The Anomalous Temperature Monitoring Unit should have both suction and pressurizing powers OFF.
- ❏ All LED displays and all lights should be off and dark for all system components.

*All of these items confirm the tool is in proper idle state. Once you have confirmed the tool is in its proper idle state, you can start your session in the Forged system and begin using the tool. If the system is not in proper idle state stop and notify Staff.

4) Start your session in the Forged system and begin using the tool.

B. Using the Tool

*Only after verifying the system is up and available for use, is in proper idle state, and you have begun your session in the Forged system may you begin using the tool

A. Set up the initial conditions

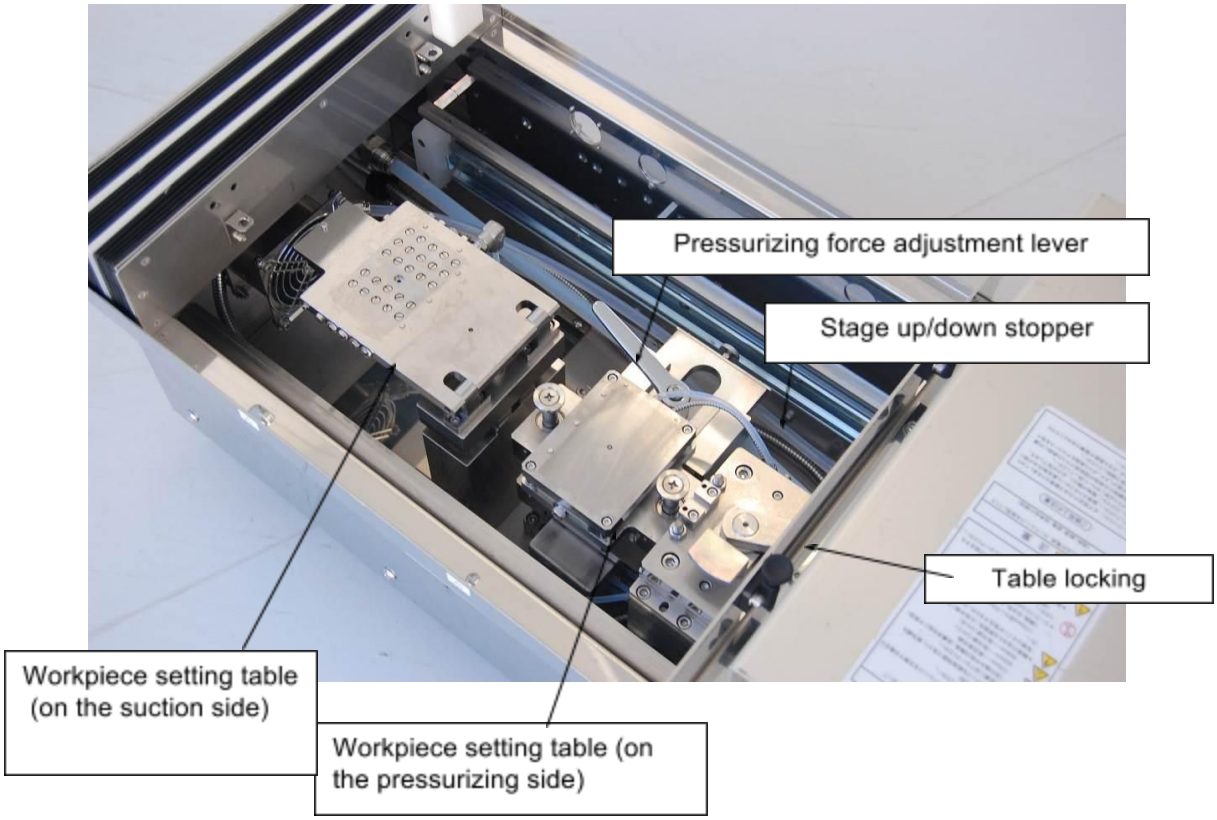
**Note: Before operating the system, be sure to verify the following initial conditions are met. Continuous operation without ensuring these initial conditions are met may result in system failures that force production stoppage and cause serious personal injury to the operator.

- ❏ Turn the red transformer power rocker switch to ON (NEVER ADJUST)
- ❏ Flip the bonding unit power switch to ON
- ❏ Open the N_2 supply gas located on the wall to the right of the tool and verify the regulator reads a value of 25-30 psi.
- ❏ Leave the specified amount of nitrogen gas flowing for 5 minutes to replace the air in the lamp housing unit with nitrogen gas. *If the replacement is not complete, ozone is generated inside and the life of the mirror and lamp may be impaired. Continue to supply the nitrogen gas during operation (regardless of whether the lamp is on or off).
- ❏ From inside the chase, open the yellow ball valve of the CDA supply and ensure the pressure reading is at 85psi.
- ❏ Flip the Excimer Photon Source Power Supply power switch to ON

B. Set up the irradiation distance by changing the stage

You will need to understand the part names of the bonding unit from section 7.4 of the Manufacturer's Operation Manual. This section is copied verbatim below:

7.4. Part Names of the Bonding Unit



Setting up the irradiation distance by changing the stage is best described in section 9.3 of the Manufacturer's Operation Manual. This section is copied verbatim below:

**Note: the stage may already be set up for your substrate thickness, if this is the case the stage may not need to be changed and section 9.3 can be skipped entirely.*

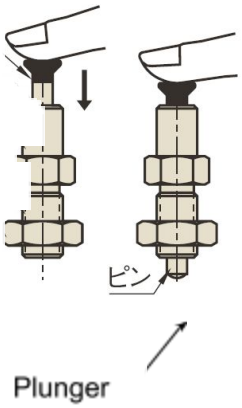
9.3. How to Change the Stage (Adjust the Irradiation Distance)

Depending on the thickness of the object to be irradiated/ bonded, change the stage so the irradiation distance from the irradiation window glass to the object is 3 mm. To change the stage height, use the appropriate spacers (P4361).

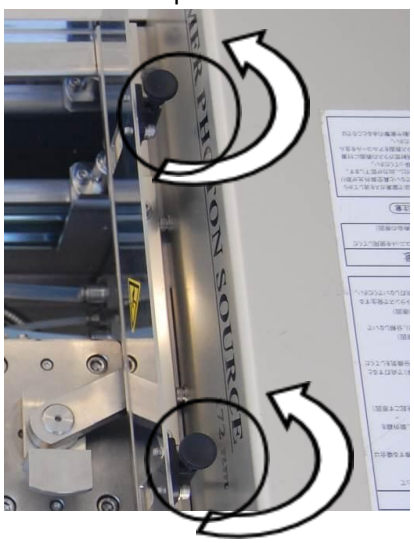
(1) Adjusting the height of the workpiece setting table (on the pressurizing side)

1 Move the lamp housing to the bonding position and secure it with the positioning plunger.
Press the button of the positioning plunger to lock it and press the button again to

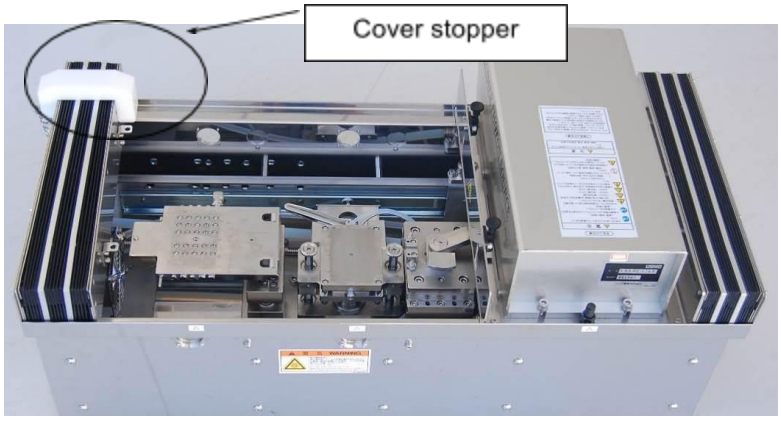
unlock it.



2 Turn the extendable cover opening/closing knobs by 90 degrees while pulling them up to unlock the extendable cover. Open the extendable cover.



3 Secure the extendable cover with the supplied cover stopper.



4 Check that the workpiece setting table (on the pressurizing side) is in the down position.
If it is in the up position, set the workpiece setting table up/down switch to the down position to move down the workpiece setting table (on the pressurizing side).

Note: The workpiece setting table up/down switch only works when the lamp housing is in the bonding position.

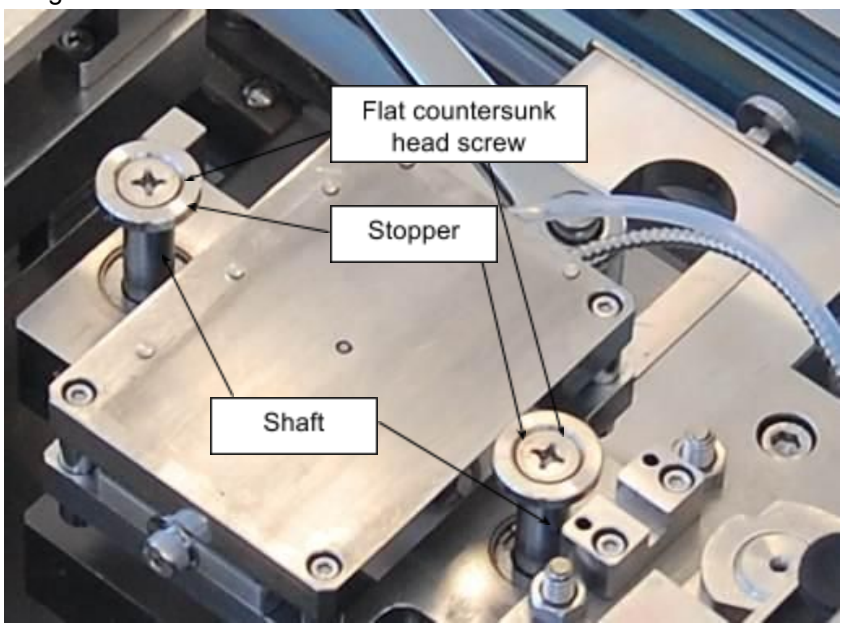
5 Select a spacer on the table below depending on the thickness of the object to be irradiated on the workpiece setting table (on the pressurizing side). If multiple spacers are necessary, use them by stacking one on top of another.

	Spacer thickness used (mm)		
Object to be irradiated thickness (mm)	1	1.5	2
1		○	
2	○	○	
3		○	○
4	○	○	○
5		○	○(2 pieces)

Spacer for Workpiece Setting Table (on the Pressurizing Side)

Note: Use a spacer in the shape shown below.

6 Loosen two flat countersunk head screws and then remove the stopper as shown in the figure below.



7 Place the spacers used onto the two shafts as shown in the figure.
8 Return the stoppers to the original position and tighten the flat countersunk head screws.

Note: Do not place spacers with different thicknesses at the two positions.

(2) Adjusting the height of the workpiece setting table (on the suction side)

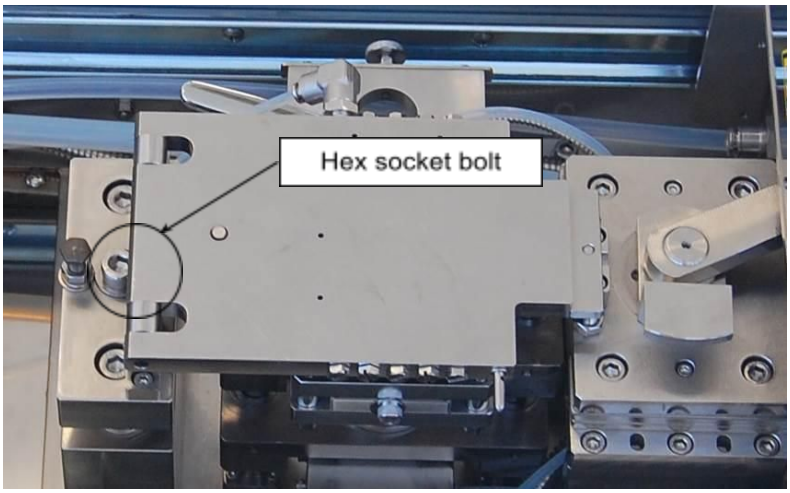
1 Depending on the thickness of the object to be irradiated on the workpiece setting table (on the suction side), select a spacer from the table below. Use spacers by stacking one on top of another.

	Spacer thickness used (mm)			
Object to be irradiated thickness (mm)	1	2	3	5
1	○	○	○	○
2		○	○	○
3	○		○	○
4			○	○
5		○		○

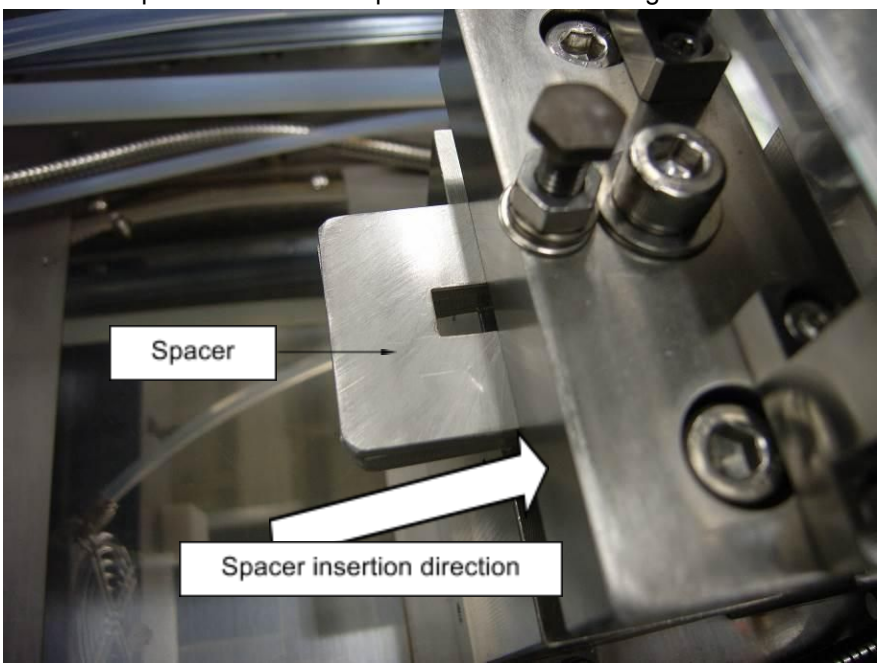
Spacer for Workpiece Setting Table (on the Suction Side)

Note: Use a spacer in the shape shown below.

2 Reverse the workpiece setting table (on the suction side) and loosen the hex socket bolt shown in the figure with a hex wrench (nominal 6).



3 Insert the spacer used into the position shown in the figure.



4 Tighten the hex socket bolt.

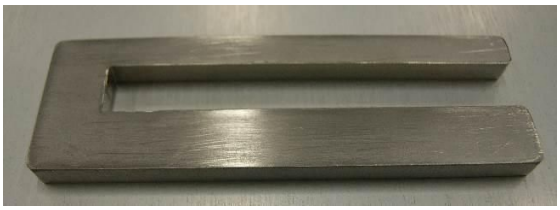
(3) Adjusting the height of the table locking mechanism

1 Depending on the thickness of the irradiation target placed on the workpiece setting table (on the suction side), select a spacer from the table below. Use spacers by stacking one on top of another.

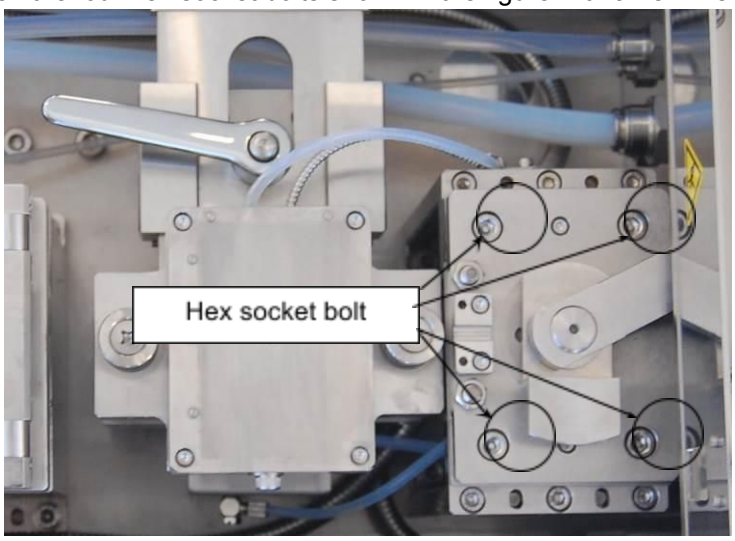
	Spacer thickness used (mm)			
Object to be irradiated thickness (mm)	1	2	3	5
1	○	○	○	○
2		○	○	○
3	○		○	○
4			○	○
5		○		○

Spacer for Table Locking Mechanism

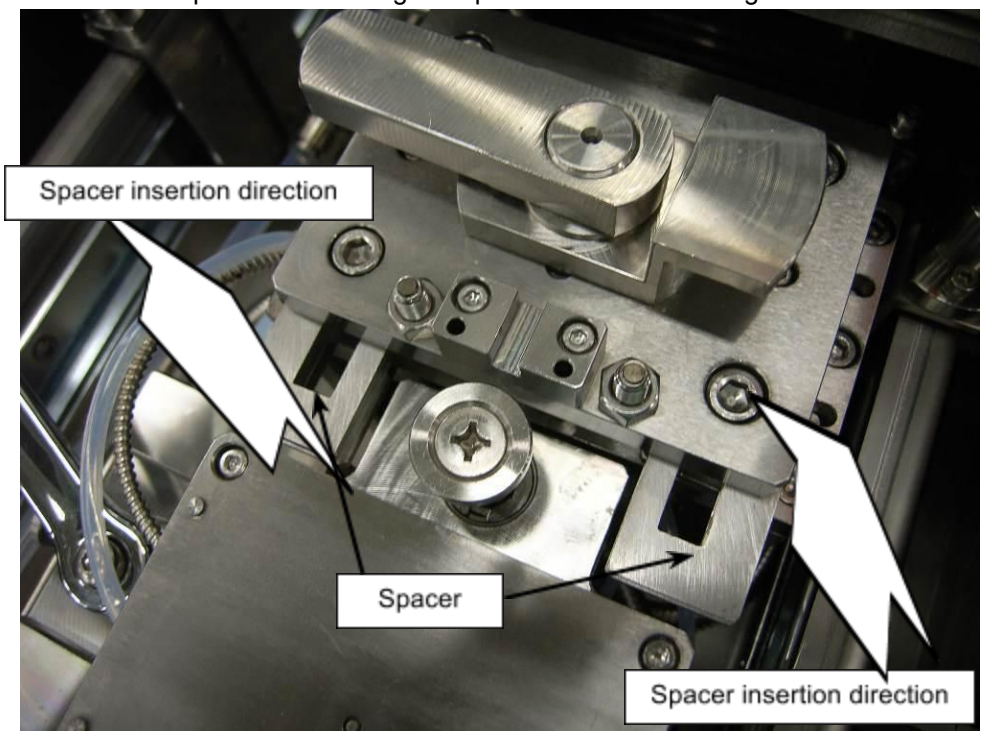
Note: Use a spacer in the shape shown below.



2 Loosen the four hex socket bolts shown in the figure with a hex wrench (nominal 5).



3 Pass the spacer used through the position shown in the figure.



4 Tighten the hex socket bolts.

C. Set the Object to be Irradiated

This is best described in section 9.4 of the Manufacturer's Operation Manual. This section is copied verbatim below:

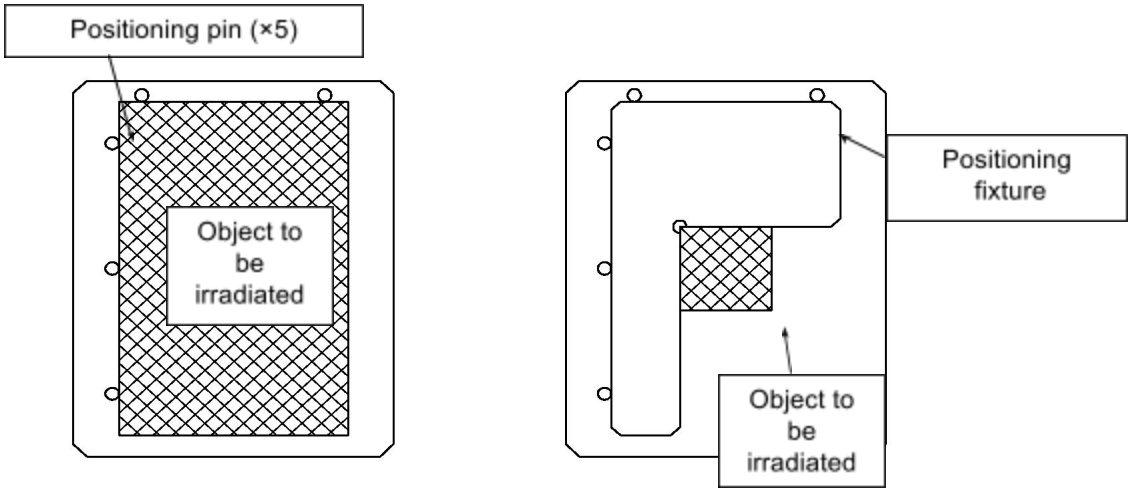
9.4. Setting the Object to be Irradiated

(1) Place one of the objects to be irradiated / bonded on the workpiece setting table (on the pressurizing side). Positioning pins are arranged on the workpiece setting table (on the pressurizing side). Align the object to be irradiated with the positioning pins, or if the object to be irradiated is small, use a fixture for positioning the objects to be irradiated.

<Notes for making a fixture for positioning the irradiation target>

・Ensure that the object to be irradiated is on the center of the stage

・The height of the positioning fixture shall be lower than the height of the positioning pins and the object to be irradiated.

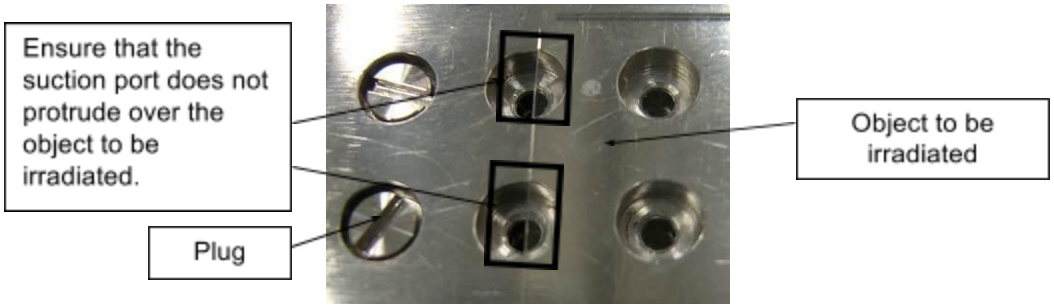


(2) Place one of the objects to be irradiated/ bonded on the workpiece setting table (on the suction side).

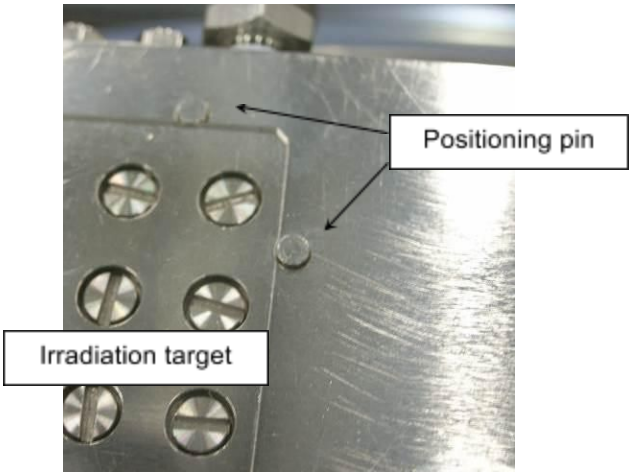
Note 1: Attach or detach the suction port plug depending on the size and shape of the irradiation target.
Only the part for which the plug is detached is sucked.

Note 2: Use a flathead screwdriver to attach or detach the plug.

Note 3: Ensure that the suction port is covered with the object to be irradiated completely. Failure to do so decreases the suction force. Furthermore, ozone is sucked through the suction port when the lamp turns on, resulting in a failure of the electrical parts.



Positioning pins are also arranged on the workpiece setting table (on the suction side). Align the object to be irradiated with the positioning pins, or use a fixture for positioning the object to be irradiated.



(3) Set the workpiece suction switch on the operation panel to ON to suck the workpiece set on the workpiece setting table (on the suction side).
Check in advance that the object to be irradiated does not fall from the workpiece setting table (on the suction side) when reversing the table.

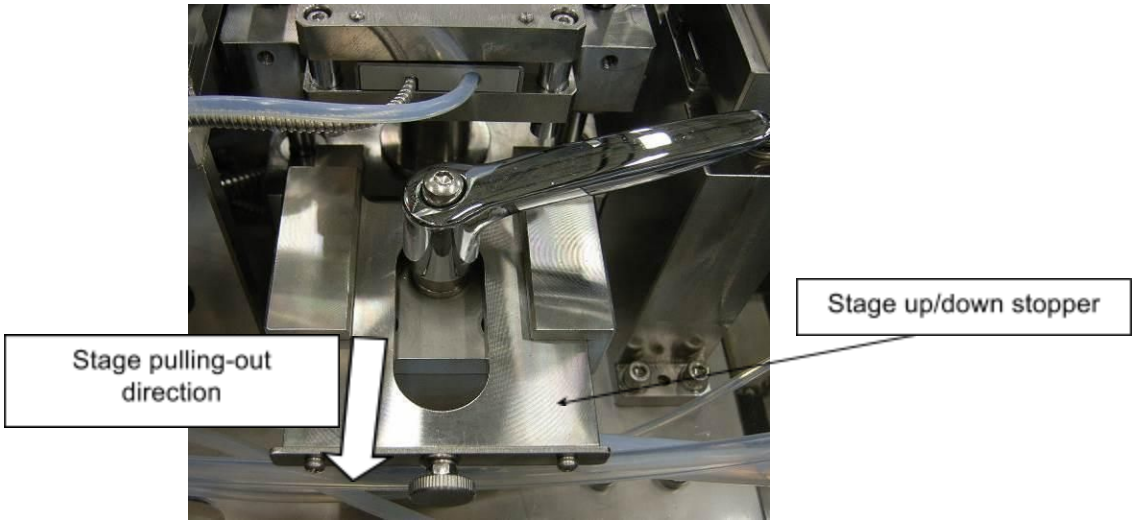
D. Set and/or Adjust the Desired Pressurizing Force

This is best described in section 9.5 of the Manufacturer's Operation Manual. This section is copied verbatim below:

9.5. How to Adjust the Pressurizing Force

When pressure is applied for the first time, adjust the pressurizing force applied to the irradiation target before irradiating the object with UV light. In particular, when the thickness of the object to be irradiated is changed (the spacer for changing the stage is changed), or when the size of the object to be irradiated is changed, adjust the pressurizing force before the operation. Failure to do so may damage the object to be irradiated.

(1) Check the lamp house is in the bonding position.
(2) Check the extendable cover is open.
(3) Check the stage up/down stopper is pulled out completely.



(4) Set the workpiece setting table up/down switch to the down position to move down the workpiece setting table (on the pressurizing side).
(5) Push the stage up/down stopper in.

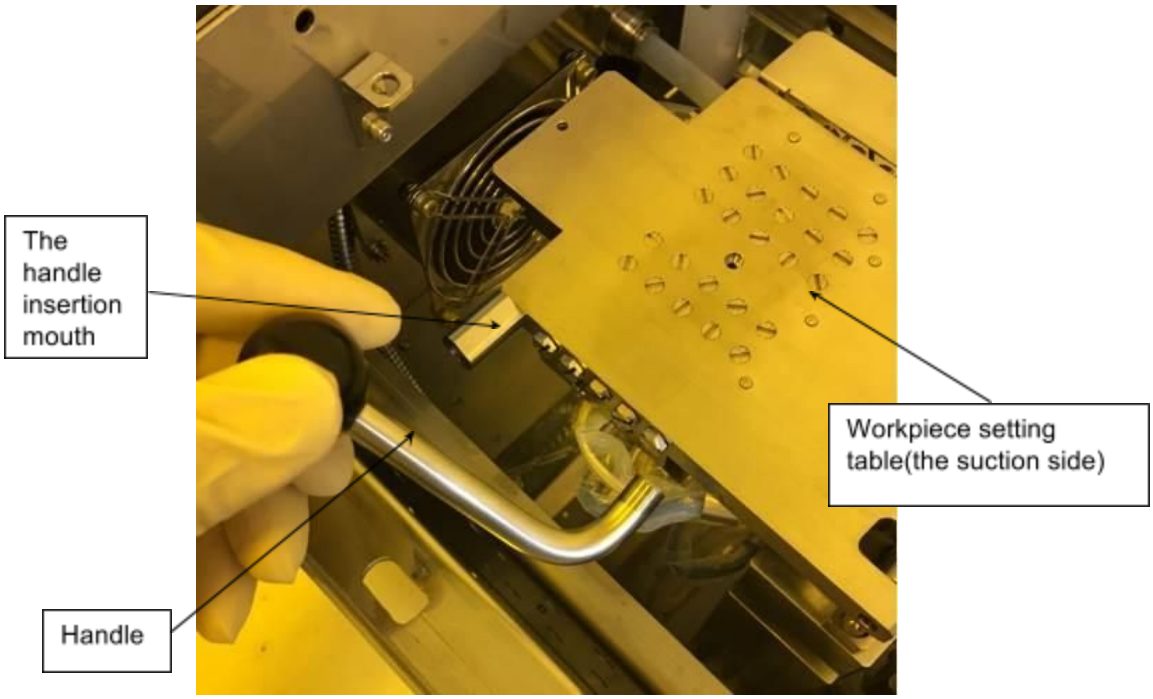
(6) Reverse the workpiece setting table (on the suction side).

This is best described in section 9.7 of the Manufacturer's Operation Manual. This section is copied verbatim below:

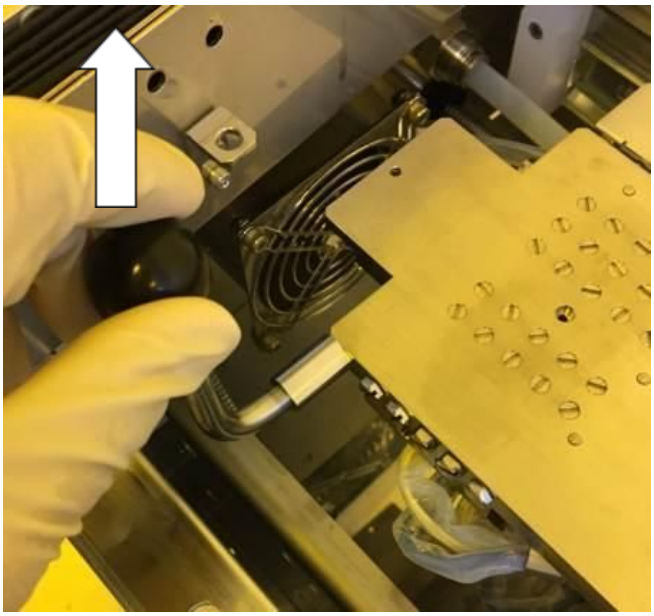
9.7. How to reverse the workpiece setting table (the suction side) during warming

The workpiece setting table (the suction side) becomes very hot. When you reverse the warming workpiece setting table, avoid touching by a direct hand. Wear heat resistant gloves if available when performing the procedure below.

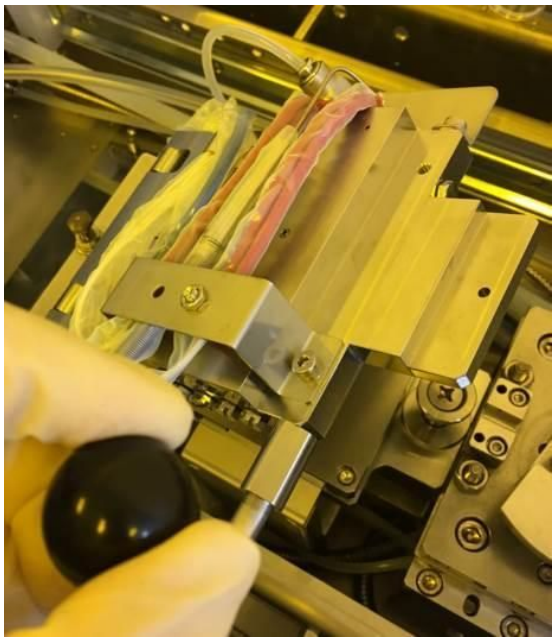
(1) Insert the handle in the handle insertion mouth of the workpiece setting table (the suction side). Insert around 5mm.



(2) Lift the workpiece setting table with the inserted handle.

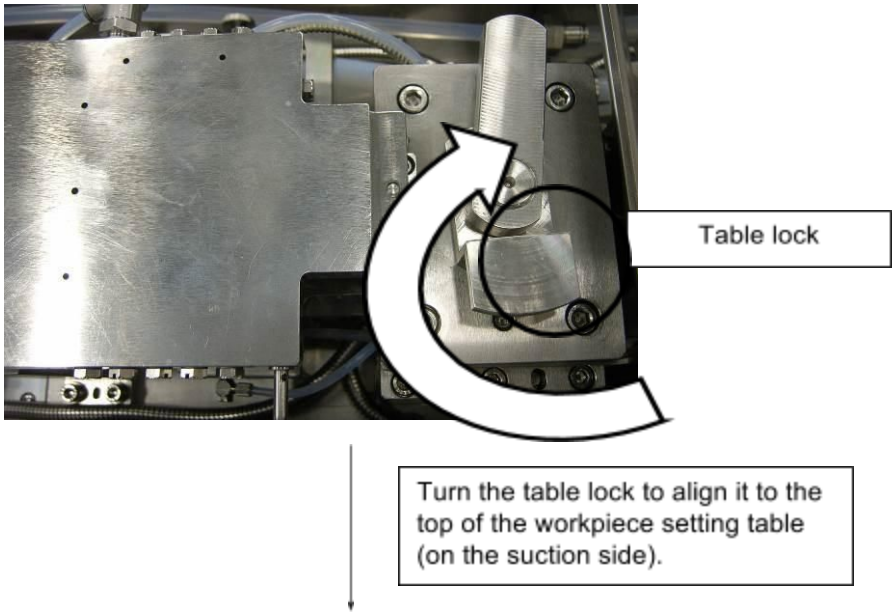


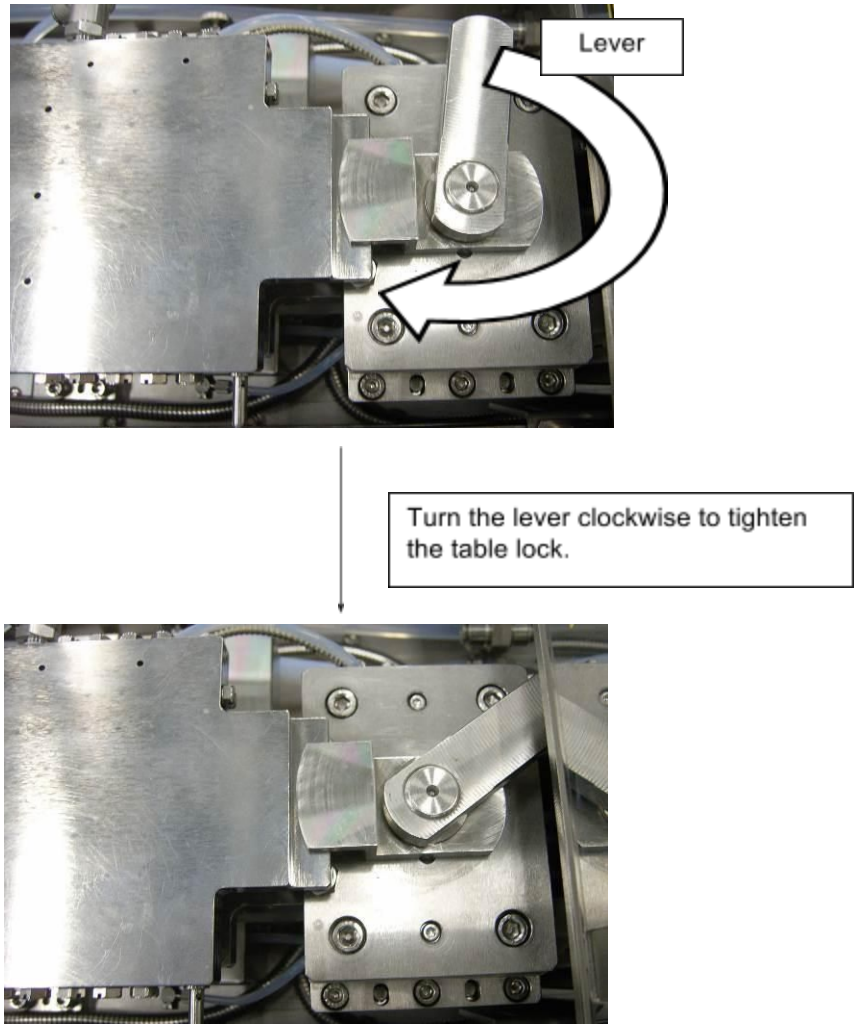
(3) Reverse the workpiece setting table.



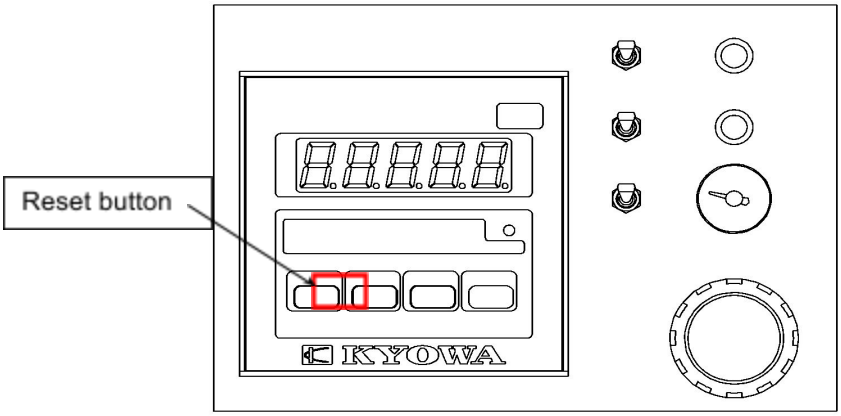
(4) Pull out the handle after reversing the workpiece setting table.

(7) Lock the workpiece setting table (on the suction side) with the table lock.





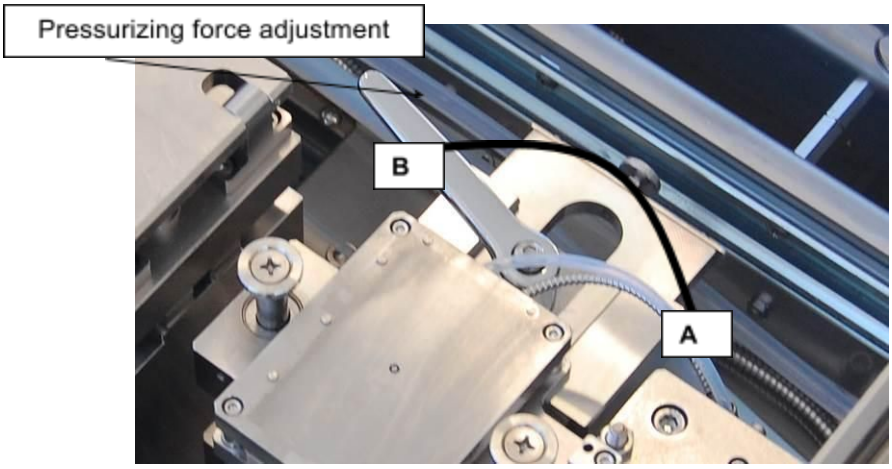
(8) Check that the value in the pressurizing force display area on the operation panel is 0.0. If the value is not 0.0, hold down the reset button on the pressurizing force display area to display 0.0.

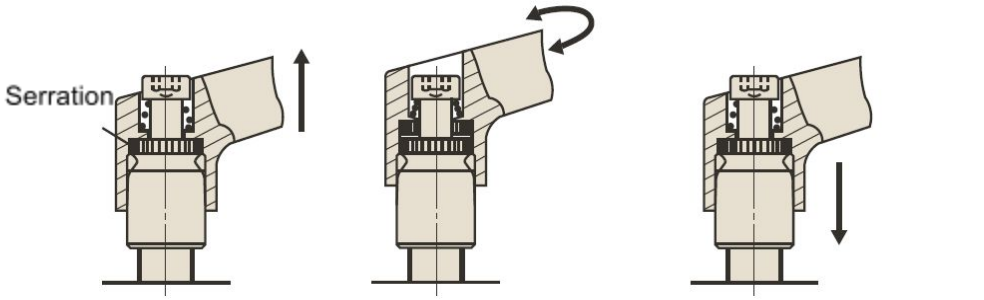


Operation Panel

(9) Set the workpiece setting table up/down switch to the up position to move up the workpiece setting table (on the pressurizing side).

(10) If the objects to be irradiated are in contact with each other, a value is displayed in the pressurizing force display area. If the objects to be irradiated are not in contact with each other, or if you want to increase or decrease the pressurizing force, turn the pressurizing force adjustment lever to adjust the pressurizing force to your desired level. Turn the pressurizing force adjustment lever counterclockwise to increase the pressurizing force, and turn the lever clockwise to decrease it.





Pulling up the lever disengages the serration and unlocks the lever.

Turn the free lever to any position.

When the lever is released, the serration is engaged by the force of a spring and the lever is locked again.

<When increasing the pressurizing force>

1 Turn the lever in the A → B direction while the lever is in the down position.
2 Pull up the lever at the B point to disengage the serration.
3 Turn the lever in the B → A direction as it is.
4 Release the lever at the A point to engage the serration.
5 Repeat the steps from ① to ④.

<When decreasing the pressurizing force>

1 Turn the lever in the B → A direction while the lever is in the down position.
2 Pull up the lever at the A point to disengage the serration.
3 Turn the lever in the A → B direction as it is.
4 Release the lever at the B point to engage the serration.
5 Repeat the steps from ① to ④.
6

Note: the screw in the center of the lever should not rotate during adjustment.

(11) When the pressurizing force has been adjusted to the desired level, set the workpiece setting table up/down switch to the down position to move down the workpiece setting table (on the pressurizing side).
(12) Unlock the table lock and reverse the workpiece setting table (on the suction side).

At this point the workpiece setting table suction side should be “open” as in not “closed” and not pressing on top of the pressurizing side.

E. Set the Desired Workpiece Setting Table Suction Side and Pressurizing Side Temperatures

**Processes can also be done at room temperature. If this is desired this section can be skipped entirely.*

*****ALWAYS LEAVE THE ANOMALOUS TEMPERATURE MONITORING UNIT SUCTION AND PRESSURIZING TEMPERATURE SETPOINTS AT 150C***

***ONLY THE TEMPERATURE/HEATER CONTROLLER TEMPERATURE SETPOINTS CAN BE ADJUSTED*

Setting the temperature is best described in section 9.6 of the Manufacturer's Operation Manual. This section is copied verbatim below:

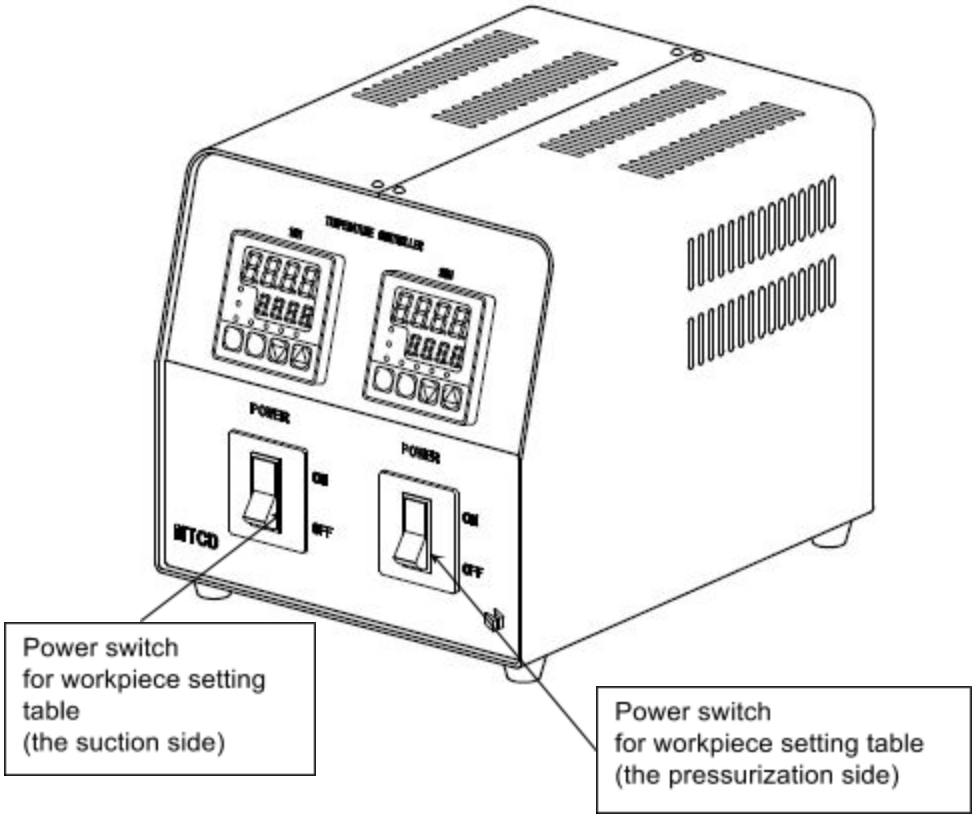
9.6. How to use the Heater Controller

(1) Turn on the POWER switch on the front of the anomalous temperature monitoring unit.

POWER Switch for workpiece setting table (on the suction side)

POWER Switch for workpiece setting table (on the pressurizing side)

(2) Turn on the POWER switch on the front.
The right side is the heater controller of the workpiece setting table (the pressurization side).
The left side is the heater controller of the workpiece setting table (the suction side).
Note. When POWER switch is ON, warming begins.

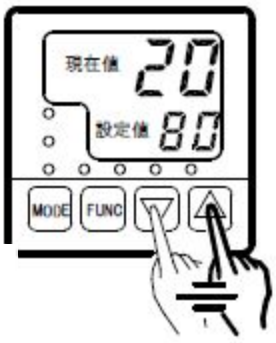


(3) Set each temperature. (NEVER MODIFY THE SETPOINTS ON THE ANOMALOUS TEMPERATURE MONITORING UNIT, ONLY ON THE TEMPERATURE/HEATER CONTROLLER)

Temperature changes when pressing the UP/DOWN key.

Temperature adjustment controls the setting temperature.

Note. The upper limit level of the temperature control is set to 150 ℃



DOWN key

UP key

G. Irradiate the substrate bonding surfaces

This is best described in section 9.8 of the Manufacturer's Operation Manual. This section is copied verbatim below:

**At this point the workpiece setting table suction side should be "open" as in not "closed" and not pressing on top of the pressurizing side.*

9.8. How to Irradiate

(1) Check the lamp house is in the bonding position.
(2) Check the stage up/down stopper is pulled out completely.
(3) Set the workpiece setting table up/down switch to the up position to move up the workpiece setting table (on the pressurizing side).
(4) Close the extendable cover (on the opening/closing side) and lock the extendable cover opening/closing knob (at two points).
(5) Release the lamp house positioning plunger and move the lamp house to the irradiation position 1. When the movement is finished, lock the lamp house with the lamp house positioning plunger.
(6) Irradiate the target set on the workpiece setting table (on the pressurizing side) with UV light according to the steps described in section 8.2 "How to Turn On/Off the Lamp."

For convenience, this section is copied here:

8.2. ON/OFF procedures

Note: Allow at least one second each for the lamp-on time and for the pause time before the next lamp-on.

8.2.1. When Turning On/Off the Lamp Manually

(1) Set the POWER switch to ON.
(2) Set the timer mode select switch to OFF.
(3) Press the LAMP ON switch to turn on the lamp.
(4) Press the LAMP OFF switch to turn off the lamp.

8.2.2. When Setting the Lamp-On Time in Timer

(1) Set the POWER switch to ON.
(2) Set the timer mode select switch to ON.
(3) Set the irradiation time with the digital switch of the lamp-on time setting timer.
(4) Press the LAMP ON switch to turn on the lamp. When the light is irradiated for the set duration, the lamp turns off, and the timer reset switch LED turns on.
* To turn off the lamp during irradiation, press the LAMP OFF switch.
(5) To turn on the lamp again, press the timer reset switch. LED turns off and returns to the initial state. Repeat the same steps all over again.

Now resume onto step (7) from the "How to Irradiate" section 9.8 below:

(7) When the irradiation is finished, release the lamp house positioning plunger while the extendable cover is closed; then move the lamp house to the irradiation position 2. When the movement is finished, lock the lamp house with the lamp house positioning plunger.
(8) As with (6), irradiate the target set on the workpiece setting table (on the suction side) with UV light.
(9) When the irradiation is finished, release the lamp house positioning plunger and move the lamp house to the bonding position. When the movement is finished, lock the lamp house with the lamp house positioning plunger.
(10) Unlock the extendable cover opening/closing knob (at two points), and then open the extendable cover (on the opening/closing side). Secure the extendable cover with the supplied cover stopper.

H. Bonding the Irradiated Substrates

Once the irradiation has been completed, the bonding of your substrates may occur.

The summary of bonding is copied verbatim below from section 9.9 of the Manufacturer's Operation Manual:

**Steps (1) & (2) below may have already been completed or may have already been skipped depending on operator preference.*

9.9. How to bond

(1) Turn on the switch of the heater controller, and set it to the temperature that you want to warm.
(2) Wait until it becomes the setting temperature.
(3) Set the workpiece setting table up/down switch to the down position to move down the workpiece setting table (on the pressurizing side).
(4) Push the stage up/down stopper in.
(5) Reverse the workpiece setting table (on the suction side).
(6) Lock the workpiece setting table (on the suction side) with a table lock.
(7) Set the workpiece setting table up/down switch to the up position to move up the workpiece setting table (on the pressurizing side).
(8) Check the pressurizing force set in section 9.5 is maintained. If the pressurizing force is deviated from the desired level, turn the pressurizing force adjustment lever to readjust it.
(9) When the specified pressurizing time has passed, set the suction switch to OFF.
(10) Set the workpiece setting table up/down switch to the down position to move down the workpiece setting table (on the pressurizing side).
(11) Unlock the table lock and reverse the workpiece setting table (on the suction side).
(12) Take out the coupled irradiation target ***(bonded substrates *CAREFUL*- surfaces may be hot, use appropriate tweezers)***
(13) Turn off the switch of the heater controller.

I. When finished using the tool, it is required to return the tool to its proper idle state before leaving and ending your session in the Forged System. Recording the process conditions along with name, date, time, etc. is also all required.

C. Return the System to Proper Idle State

- ❏ Flip the bonding unit power switch to OFF
- ❏ Turn the red transformer power rocker switch to OFF
- ❏ Close the N_2 supply gas located on the wall to the right of the tool, and ensure at the regulator reads a value of 0 psi.
- ❏ From inside the chase, close the yellow ball valve of the CDA supply and ensure the pressure reading is at 0 psi.
- ❏ Flip the Excimer Photon Source Power Supply power switch to OFF

End Your Session with the Tool

With the tool returned to proper idle state, and the log book completed, END your session on the Forged System.

Additional Info

Application Notes:

- In the training video, the softer, more flexible PDMS material is on the suction side for irradiation. It might be important to note that for long periods of suction and high temperature exposure, the little circle dots from the suction ports might leave an imprint on the PDMS. If users are experiencing this, they can switch the placements of their substrates, run at lower temperatures, or minimize/limit suction time to the smallest amount.

- If the users would like to use the timer function, they have to switch the timer to "on" before pressing the green button on the photon power supply.

- The transition from irradiation to bonding is a time sensitive procedure. If too much time passes in between these steps, the surfaces will deactivate and bonding will not occur.

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Typical bonding parameters for SUS504

Material	
PDMS :	SIM-260 (Shin-Etsu Chemical)
Silicone rubber :	2-9317-01(ASONE)
Glass :	1-3345-01(ASONE)

Material 1	Material 2	VUV exposure time [sec]		Bonding			Comment
		Material 1	Material 2	Pressure[MPa]	Temperature[℃]	Time[sec]	
PDMS	PDMS	120	120	0.2	23	300	Room temperature bonding
PDMS	PDMS	30	30	0.2	100	300	High temperature process for better bonding quality
Glass	PDMS	30	15	0.2	50	300	
Silicone rubber	Silicone rubber	300	300	0.2	23	300	
Glass	Silicone rubber	30	60	0.2	50	300	

※PDMS (or Silicone rubber) should be bonded immediately after irradiation of VUV. (Typically within a minute)

※PDMS (or Silicone rubber) should be exposed by VUV at low temperature. (Typically at room temperature)

6. Specifications

6.1. Basic Specifications

6.1.1. Applicable object to be irradiated

・Size

50 mm × 80 mm

(The size shows the maximum size of an object that can be set on the stage.)

・Thickness

1 to 5 mm (1 mm increment spacer attached)

6.1.2. UV Light Source

・Lamp unit (UV lamp) Rating 20 W × 1 lamp

6.1.3. Light output characteristics (Initial value)

・Irradiation window size 100 mm

・Radiant exitance 9 mW/cm^2 or more

(Value on the window surface after transmission through the glass)

・Measurement point Irradiation window center (1 point)

・Center wavelength 172 nm

・FWHM 14 nm

6.1.4. Irradiation Distance

・3 mm from the light irradiation window surface

(Adjust the irradiation distance by a spacer to fit the thickness of the object.)

6.1.5. Irradiation Time Setting

・Adjustable in the range of 1 s to 9,990 h (minimum unit: 1 s)

6.1.6. Pressurizing Force

・Adjustable up to 100 N.

6.1.7. Workpieces temperature

・Adjustable up to 150 ℃.

6.1.8. Dimensions

① Bonding unit (including the lamp house)

813 (W) × 457 (D) × 353 (H) (mm)

* Excluding the protrusions.

② Power supply

246 (W) × 363 (D) × 160 (H) (mm)

③ Heater controller

170 (W) × 215 (D) × 171 (H) (mm)

④ Anomalous temperature monitoring unit

250 (W) × 150 (D) × 170 (H) (mm)

6.1.9. Weight

① Bonding unit	approx. 55 kg
② Lamp house	approx. 6 kg
③ Power supply	approx. 4 kg
④ Heater controller	approx. 5 kg
⑤ Anomalous temperature monitoring unit	approx. 10 kg

6.1.10. Exterior

① Bonding unit	Stand: SUS304, etc. Processing chamber: SUS304, etc. Extendable cover: Neoprene rubber, etc.
② Lamp house	SUS304 and aluminum
③ Power supply	Aluminum
④ Heater controller	Baking coating
⑤ Anomalous temperature monitoring unit	Aluminum

6.2. Operating Conditions

6.2.1. Operating Temperature and Humidity

① Temperature 20 to 30℃
② Humidity 20 to 80%RH

6.2.2. Operating Environment

① No condensation
② Non-corrosive atmosphere
③ In a room without vibrations

11. Precautions for Use

11.1. Precautions for High Voltage

A high voltage of several thousand volts is applied to the lamp. It is very dangerous if the lamp is turned on with the top cover of the lamp house open. Be sure to turn on the lamp with the cover mounted.

* Never disassemble or modify the power supply and the lamp house.

11.2. Precautions for UV

Light irradiated from the lamp is UV light. Do not look at the light directly or indirect while the lamp is on. Ensure skin is not subjected to the light of the lamp directly or indirectly.

11.3. Precautions for Ozone

- If the lamp is turned on in an atmosphere containing oxygen, ozone is generated. Be sure to exhaust air and connect the exhaust duct to your exhaust system.
- Ozone concentration in the operating environment is limited to 0.1 ppm or less. Accordingly, exhaust or ventilate air to ensure the ozone concentration is maintained at 0.1 ppm or less.

11.4. Precautions for Light Output

- When the input voltage changes, the light output also changes. If the light output needs to be stable, use a stabilized power supply, etc.
- The light output may decrease during the operation due to the characteristic of the irradiation window glass. Pay attention to the control of the illuminance value when setting the irradiation conditions.

11.5. Others

- Glass products (lamp and window) are used. Do not do the following: drop them, strike them against an object, apply undue force to them, and scratch them.
- Do not use this system in a corrosive atmosphere or in a dusty place.
- Note that frequent plugging and unplugging of a cable may cause a disconnection