Operating Manual
UV Nanoimprinter
Model: EUN-4200
(AEUN0101)

Please read this manual thoroughly and understand the contents before performing actual operation, inspection or maintenance.

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Thank you for purchasing our equipment.

- This manual contains important information on using this equipment safely.
- Please read this manual carefully and make sure you are familiar with the contents such as operating instructions before starting operation.
- If you don’t follow the manual as described, it may cause a serious and harmful accident.
- Store this manual in a readily accessible location for future reference.

⚠️ Warning!
Inadvertent use of this equipment may result in acute injury or death. An operator or maintenance personnel must read this manual carefully before operating or performing maintenance to this equipment.

- Do not start using this equipment until you fully understand and become familiar with the contents of this manual.
- Please store this manual in an accessible location and read this manual repeatedly.
- In order to use this equipment safely, please make sure you perform inspection and maintenance.
- Please re-order this manual in case of having it lost or damaged.
- In the case of assigning or transferring this equipment to another party, please make sure the manual is attached to the equipment so that the manual too is in the new owner’s hand.
- For any inquiry regarding the equipment or this manual, please contact our sales/technical representatives.
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Introduction: Read first!

For safety use

- Most of unwanted accidents occur due to operation neglecting the very basic safety rules or poor and faulty maintenance. Please read carefully and thoroughly this manual and obtain complete understanding of all the cautions described hereunder.

- The following warning labels are introduced to this equipment and the manual in order to bring you better understanding of levels of danger:

  ![DANGER!]
  
  This label indicates a high level of imminent danger or such point that could result in acute injury or death if such status remains.

  ![WARNING!]
  
  This label indicates a dangerous situation or such point that could result in serious injury or even death if such status remains.

  ![CAUTION!]
  
  This label indicates a hazardous situation or such point that could result in less severe to minor injury or some material damage as the case may be if such status remains.
Chapter 1. Summery

1-1 Equipment summery
This equipment is a UV-curing Imprint small experiment unit, featuring a vertically air-pressurized driving cylinder and an LED light source equipment as standard.

1-2 Parts and functions

① Head part
This part functions by an air-pressurized driving cylinder.
A UV-LED light source is built in. (Detachable)
It has a Quartz stage. (Pressing area: 78 mm x 78 mm)
Stage part
This part holds work-piece.
Available parallel adjustment feature (Optional)
Available vacuum-chucking stage (Optional)

Cylinder pressure control part
A precision regulator controls pressure in the driving cylinder.

Head speed control part
This part controls the head's vertical ascending/descending velocity.
Chapter 2. Specifications

2-1 General specifications
2-1-1 Power unit
Single-phase AC200～240V 50/60Hz (EU model)
Rated current @ 0.14A

2-1-2 Size (external) and weight
Size (external: L x W x D): 222 mm x 222 mm x 436 mm
Weight: 15.5 kg

2-1-3 Safety features
The head part won’t descend when the front door is open. (equipped with inter-locking feature)

2-1-4 Maximum imprinting area
Max. 78 mm x 78 mm (compatible with 4-inch metal mold/die)

2-1-5 Imprinting intencity
90N～400N (9kgf～40kgf)

2-1-6 UV light source
Type: LED-based, Model: NS375LIMESC (Designed & Manufactured by Engineering System Co., Ltd.)
Wavelength: 375 nm
UV intensity: 2.57mW/cm²
Irradiation inconsistency: within 15 % inside the range
Cooling method: natural air
Power input: Single-phase AC200～240V (ON/OFF is manually controlled)
Capability of switching between continuous irradiation and pulse irradiation while using.
Pulse duty: 0.1 sec

2-1-7 Modules and framework
(1) Head module
With a Quartz stage. (Pressing area: 78 mm x 78 mm)
The quartz stage is driven up and down by an air cylinder.
A UV-LED light source is built in. (Detachable)

(2) Stage module
This part holds a work-piece.
Available parallel adjustment feature. (Optional)
Available vacuum-chucking stage. (Optional)

(3) Driving cylinder pressure control module
A precision regulator controls pressure in the driving cylinder.

(4) Head speed control module
This part controls the head’s vertical ascending/descending velocity.
2-1-8 Module descriptions

(1) Head module
   ① Driving method: Air cylinder-drive
   ② Cylinder stroke: 50mm
   ③ Operation: Manual lever
   ④ Equipped with UV light source unit
   ⑤ Equipped with Quartz stage
      Quartz surface flatness: 2 μm
      Pressing area: 78 mm × 78 mm

(2) Stage module
   ① Work stage surface: Mirror finish (Surface flatness: 2 μm  Ra0.05)
   ② Material:
      Work stage: SUS304 (JIS)
      Base part: A5052 (JIS)
   ③ Parallel adjustment feature: ±2 degrees by screw fixation with a knurled knob. (Optional)

(3) Driving cylinder pressure control module
   ① Control method: by a handle
   ② Control range: 0.02MPa～0.4MPa (Factory default: 0.2MPa)

(4) Head speed control module
   ① Control method: Speed controller (for cylinder speed control)
   ② The controller is graduated for adjustment.
2—2 Conditions of use

⚠️ CAUTION!
Do not operate within 5m parameter of electric noise sources such as electric welder. The inductive noise may cause a machine blunder. In the case an operation under such environment is unavoidable, please apply proper noise suppression.

2—2—1 Installation environment
Avoid use of the equipment under such undesirable environment as follows:
● Places where surrounding temperature is out of the range of 0～40℃.
● Places where surrounding humidity is out of the range of 35～80%RH.
● Places contains significant level of dust, salinity or iron.
● Places exposed to direct sunlight.
● Places where vibration or impact may directly affect the equipment.
● Places near corrosive gas, inflammable gas or flammable gas.
● Places where the equipment could be exposed to organic solvent such as benzine, thinner and alcohols as well as strong alkaline materials such as ammonium and caustic soda.
● Places where an operator’s safety space (more than 1 m outside of the equipment) cannot be secured.

2—2—2 Installation instruction
Please place the equipment on a horizontal desk that can at least hold the equipment weight.

2—2—3 Connecting utilities
Electricity
Single-phase AC200～240V  50/60Hz  0.14A (EU model)

Pressurized air
Clean dry air (over 0.4 MPa)

※ When using a vacuum-chucking stage (Optional), a vacuum source is additionally required.
Chapter 3. Operating instruction

3—1 For safe operation

⚠️ DANGER!

For safe operation, please make sure the following conditions are satisfied. Otherwise, it may result in a serious and dangerous accident.

- Please carefully and thoroughly read the manual and fully understand operating process before starting to use the equipment.
- Do not open the front door while irradiating UV. It may harm your body.
- Do not place your hand into the equipment while the head part is moving. You may get your hand caught in the equipment.

3—2 Connecting utilities

1. Power plug
2. Connector for pressurized air
   Connector to supply clean dry air to the driving cylinder for the head part.
Connector to a vacuum source

Connector to a vacuum source for the vacuum-chucking stage (Optional).

1) Supply clean dry air (over 0.4MPa) to the ② Connector for pressurized air. The head part then lifts.

※Once the supply of the clean dry air to the ② Connector for pressurized air is shut off, the head part then descends.

⚠️ CAUTION!
Once clean dry air is shut off, the head part descends. Do not leave any outshoots on the work stage. It may damage the quartz stage.

※Connect vacuum pump to the ③ Connector to a vacuum source when using adsorption feature of the vacuum-chucking stage (Optional).

2) Connect ① Power plug to AC200～240V.

3—3 Pressure & Head speed adjustment

Pressure control handle

It controls driving pressure for quartz stage.

Turning clockwise increases the pressure, and turning it counterclockwise decreases the pressure.

Set pressure is indicated in the ⑤ Pressure gauge.

Controllable range is between 0.02～0.4MPa.
⑤ Pressure gauge
It indicates current set driving pressure for quartz stage.
Controllable range is between 0MPa～0.4MPa.

⑥ Head part’s ascending speed control knob
It trims the head part’s ascending speed. Turning the knob clockwise increases the head part’s speed as the graduated number increases.
The factory default is at 1.0.

⑦ Head part’s descending speed control knob
It trims the head part’s descending speed. Turning the knob clockwise increases the head part’s speed as the graduated number increases.
The factory default is at 4.0.

⑧ Head part adjusting lever
The lever lowers the head part down as it’s pressed down. The lever lifts the head part up as it’s lifted up.

※As long as the front door is left open, the head part won’t come down even with the lever pulled down.
Also, despite the position of the head part, it descends to the top end once the front door is open.

⑨ UV irradiation switch
In order to irradiate UV, flip the switch to the right.

1) Turn the ④ Pressure control handle and check the ⑤ Pressure gauge to set proper loading pressure.
   Please consider a balance between pressure by the regulator and the loading.

2) Adjust the head part’s descending speed by turning the ⑦ Head part’s descending speed control knob as well as controlling the ⑧ Head part adjusting lever.

⚠️WARNING!
Do not place your hand into the equipment while the head part is moving. You may get your hand caught in the equipment.

3) Adjust the head part’s ascending speed by turning the ⑥ Head part’s ascending speed control knob as well as controlling the ⑧ Head part adjusting lever.

⚠️WARNING!
Do not place your hand into the equipment while the head part is moving. You may get your hand caught in the equipment.
3-4 Parallel adjustment system (optional)

⑩ **Left parallel adjustment knob**
It aligns tilt on the surface along the A axis so that it parallels to the quartz stage.
Adjustable range is ±2 degrees.
Fully turning the knob (360 degrees) makes the position right below the knob displaced downward to the maximum of 0.7 mm.

⑪ **Right horizontal position control knob**
It aligns tilt on the surface along the B axis so that it parallels to the quartz stage.
Adjustable range is ±2 degrees.
Fully turning the knob (360 degrees) makes the position right below the knob displaced downward to the maximum of 0.7 mm.
1) Open the front door and place a pressure sensitive paper (100 mm x 100 mm) on the work stage.  
※For the pressure sensitive paper, please use ones with pressure sensitivity of which the range is between 0.05MPa~XMPa.  
※Set the pressure of the regulator at 0.4 MPa.

2) Close the front door and pull down the ⑧ Head part adjusting lever. The head part then descends.

3) Pull up the ⑧ Head part adjusting lever to move the head part upward.

4) Repeat process 1) through 3) with further adjusting the ⑩ Right parallel adjustment knob and the ⑪ Left horizontal position control knob to reduce uneven color development on the paper sensitive paper to none.

※When using pressure sensitive papers with sensitivity range between 0.2MP~XMPa, fit the paper into the size of 100 mm x 20 mm and place it as seen in the pictures below and do the same adjustments prescribed above. (For your information, if a regulator pressure is set at 0.4 MP, the actual pressure over the pressure sensitive paper is about 0.3 MP.)
1) Open the front door, place a PET film on the work stage and set up a UV curable resin as well as a metal mold/die.

2) Close the front door and press the ⑧ Head part adjusting lever down. The head part then descends.
3) Make sure the head part is fully descended. Flip the ⑨ UV irradiation switch to the right and irradiate UV over the work-piece for a certain period of time.

⚠️ CAUTION!
Do not open the front door while irradiating UV. It may harm your body.

4) Flip the ⑨ UV irradiation switch to the left and pull up the ⑧ Head part adjusting lever to move the head part up.

5) Open the front door and eject the work-piece.
3—6 Setting up work stage

⑫ Left work stage fixation knob
It stabilizes the work stage. Use this knob when installing or detaching the work stage.

⑬ Right work stage fixation knob
It stabilizes the work stage. Use this knob when installing or detaching the work stage.

1) Place the work stage onto the base located in the center of the inner room.

※Be extremely careful not to leave any dust trapped in between the work stage and the base.
2) Stabilize the work stage by adjusting the ⑫ Left work stage fixation knob and the ⑬ Right work stage fixation knob. If you find it difficult accessing to the knobs from the front door, try to access from the side doors.

**WARNING!**
Do not place your hand into the equipment while the head part is moving. You may get your hand caught in the equipment.
※In the case of using the vacuum-chucking stage (Optional), connect the tube stemming from the back of the work stage to the connector on the rear side of the equipment.

⚠️WARNING!
Do not place your hand into the equipment while the head part is moving. You may get your hand caught in the equipment.
3-7 Attaching quartz stage

⑭ Quartz stage
The stage delivers pressure to the work-piece. It, however, transmits UV light.

⑮ Quartz stage stabilizing plate
Quartz stage is seated on this plate.

⑯ Right quartz stage stabilizing block
The wedge-shaped block stabilizes the quartz stage. Use this when attaching/detaching the quartz stage.

⑰ Rear quartz stage stabilizing block
The wedge-shaped block stabilizes the quartz stage.

⑱ Left quartz stage stabilizing block
The wedge-shaped block stabilizes the quartz stage.
10 Quartz stage easy detaching knob
Use this knob when detaching the quartz stage.
Turning the knob clockwise moves the Right quartz stage stabilizing block towards the center, and it stabilizes the quartz stage by a reactive force from the Left quartz stage stabilizing block.
Turning the knob counterclockwise bring the exact opposite effect.

1) Open the front and the right side doors.
2) Turn the ⑲ Quartz stage easy detaching knob counterclockwise and make sure the ⑯ Right quartz stage stabilizing block slides slightly outward. Contact the ④ quartz stage to the ⑧ Quartz stage stabilizing plate, and then slide it along both the ⑯ Right quartz stage stabilizing block and ⑱ Left quartz stage stabilizing block.

3) Further, make sure the ④ quartz stage slides all the way seated so that the stage presses the ⑫ Rear quartz stage stabilizing block.

⚠️ CAUTION!
Do not tighten the ⑪ Quartz stage easy detaching knob too much.
It may damage ⑭ Right quartz stage stabilizing block.
4) Turn the ⑲ Quartz stage easy detaching knob clockwise within limits.

5) Make sure the ⑳ quartz stage is now fully stabilized. (To the extent that you cannot pull the ⑳ quartz stage toward the front.)

3—8 Detaching quartz stage

1) Open the front and the right side doors.

2) Slightly turn the ⑱ Quartz stage easy detaching knob counterclockwise. (Turning it full circle is enough.)

3) Pull the ⑳ quartz stage out.
Chapter 4. Troubleshooting Guide

4-1 In the case of troubles

This chapter explains and introduces safe self-diagnostic troubleshooting guides. Should the condition not be solved by the following steps or should any other troubles that are not indicated below occur, please immediately contact our customer/technical representatives.

⚠️ WARNING!

In the case of troubles, do not place your hand in the equipment. You may get your hand caught in the equipment if the quartz stage is still running. Further, should you approach near the light source, you may suffer burn injury.

⚠️ CAUTION!

When you restart to operate the equipment after troubles, make sure you remove any object that could be the source of the troubles. Otherwise, it may damage the equipment.

＜List of possible errors＞

<table>
<thead>
<tr>
<th>What’s wrong?</th>
<th>Diagnostics</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The head part makes no move.</td>
<td>① Pressurized air may not be provided. ② Head part’s speed control knobs may be fully tightened. ③ The front, right side or left side doors may be left open.</td>
<td>① Please check the connector located in the back of the equipment. ② Please return the level of the control knobs to factory defaults. Factory defaults (Ascend: 1.0 Descend: 4.0) ③ Please make sure doors are all closed.</td>
</tr>
<tr>
<td>No UV irradiation.</td>
<td>Power source may be disconnected.</td>
<td>Please make sure that the power cable is properly plugged at the back of the equipment.</td>
</tr>
</tbody>
</table>
Chapter 5. Inspection and maintenance

5-1 Outlines for Inspection & Maintenance

<table>
<thead>
<tr>
<th>Inspection points</th>
<th>Inspection guides</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front door interlock</td>
<td>Make sure the head part does not descend while the front door is open and the head part adjusting lever is down.</td>
<td>Before operation</td>
</tr>
<tr>
<td>Right side door interlock</td>
<td>Make sure the head part does not descend while the right side door is open and the head part adjusting lever is down.</td>
<td>Before operation</td>
</tr>
<tr>
<td>Both side doors’ interlock</td>
<td>Make sure the head part does not descend while the left door is open and the head part adjusting lever is down.</td>
<td>Before operation</td>
</tr>
<tr>
<td>The whole system</td>
<td>See if there is any dust on the parts of the equipment, and perform thorough cleaning of the equipment as a whole.</td>
<td>Before operation</td>
</tr>
</tbody>
</table>

Should you find any suspicious condition, please immediately contact our customer/technical representatives.
Revision log

29/Jan/2009  Revised page 16 through page 18 due to addition of Quartz stage easy detaching knob.