CARIMA FLAGSHIP
DESKTOP 3D PRINTER

carima

EM

USER MANUAL

EM

Carima's EM is an educational DLP 3D printer that is optimized for educational use and prints precise and high-resolution models despite being an entry-level equipment.

CMYK RESIN

RoHs₂ Certified
Biocompatible

CLEANER

Nontoxic
Nonflammable
Washable
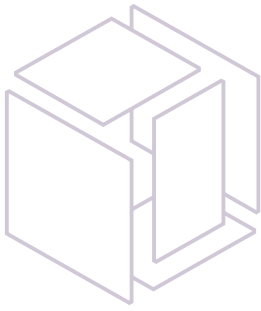
PRECISION

100μm
High precision resolution

CONVENIENCE

7inch
Touch LCD with user friendly UI
Wi-Fi

carima 3D PRINTING TOTAL SOLUTION SPECIALIZED CO. www.carima.com

This manual provides
instructions on how to
use the "EM."
Understand how to
use "EM" through the
manual
and experience Carima's "EM"
easily and conveniently.

Contents

Introduction

EM Specification

EM is optimized for printing highly precise models. This ultra-precise DLP printer is suitable for dental, jewelry, design, prototype, and R&D industries.

Printing Size(mm) [W x D x H]
128 x 80 x 170

Precision
100 μm

Product Size (mm) [W x D x H]
400 x 340 x 650

Layer Thickness
25, 50, 100 μm

Weight
20 kg / 44 lbs

Using Environment
18-26 (℃) / 64-79 (℉)
20% - 50% (humidity)

Light Source
405nm UV LED

Control Type
Embedded touch screen

Resolution
FHD 1920 x 1080

Material
(Photopolymer) resin used in dental, design, prototype and R&D industries.
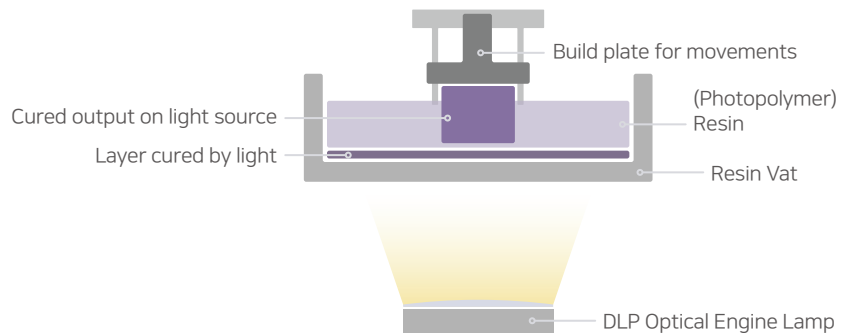
Power
DC 24V 5A with Adapter

○ DLP 3D Print Method

DLP: Digital Light Processing
Uses digital projector screen to flash an image of layer across the plate.

A cross-section photograph of the output is laminated by irradiating the photo-curable liquid resin with UV light.
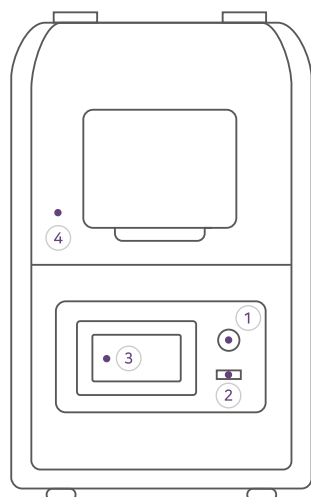
Due to the optical mask, the cross-sectional photograph of the output is totally inspected.

Because of this surface unit lamination method, the output speed is fast and the surface roughness is high, so it is possible to make use of precision.
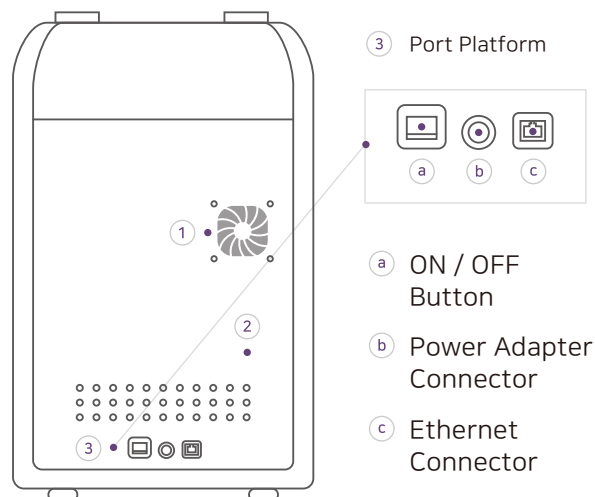
Build plate for movements

Cured output on light source

(Photopolymer) Resin

Layer cured by light

Resin Vat

DLP Optical Engine Lamp

Product Overview

01 Front

① LED Power Button   ③ LCD Touch Screen

② USB Port   ④ Print Room Cover

02 Back

③ Port Platform

ⓐ ON / OFF Button

ⓑ Power Adapter Connector

ⓒ Ethernet Connector

① Printer Cooler

② Product Information Label

03 Internal Structure

ⓐ Build Plate Fixing Pin

ⓑ Build Plate Handle
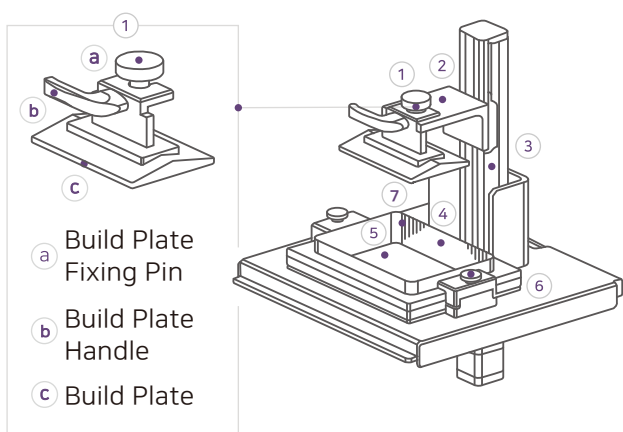
ⓒ Build Plate

① Build Plate Module   ④ Resin Vat   ⑦ Resin Volume Indicator

② Build Plate Fixing Base   ⑤ FEP Film

③ Actuator   ⑥ Vat Retention Knob (located on both sides)

04 Size

40 cm

65 cm

180 cm

75 cm
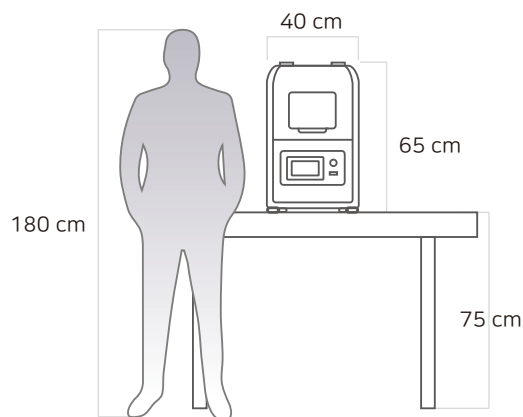
* Build plate, vat, FEP film, etc. are accessories. To purchase additional accessories, please contact Carima.

Safety Warnings

This information is intended to protect your safety and prevent property damage.
Please be aware of the precautions before using, to prevent serious injuries and printer damage.

When printing, put the printer in a well-ventilated place because resin may smell.

Setting up a printer in a place with a lot of moisture or temperature changes can cause deformation and malfunction of the product.

If the printer power cable and USB cable are damaged due to being pulled or stepped on the rough surface, please note that sparking or voltage malfunction may occur.
In addition, there is a risk of fire due to overheating when the power is turned off.

Do not turn the power switch off, located on the back of the printer, when the printer is on.
A forced shut down shortens the life of the printer engine and can cause mechanical failure.
Use the 'Power Off' or the 'Auto Shut Down' button to turn the printer off.

When moving the printer, be sure to completely shut down the printer, and then remove the vat and build plate so that the resin in the vat does not overflow or leak.

If metal fragments and other types of liquid leaks into the printer, it may cause mechanical malfunction.
Also, operating the printer with wet hands may cause electric shock. Use protective equipment while using the printer.
* Latex rubber gloves can also be used in place of the nitrile gloves provided.

Do not use volatile objects near the printer as they may cause fire or explosion.

There are potential risks to the printer in terms of chemical composition and voltage. To prevent injury on children and pets, please install the printer in a safe place.
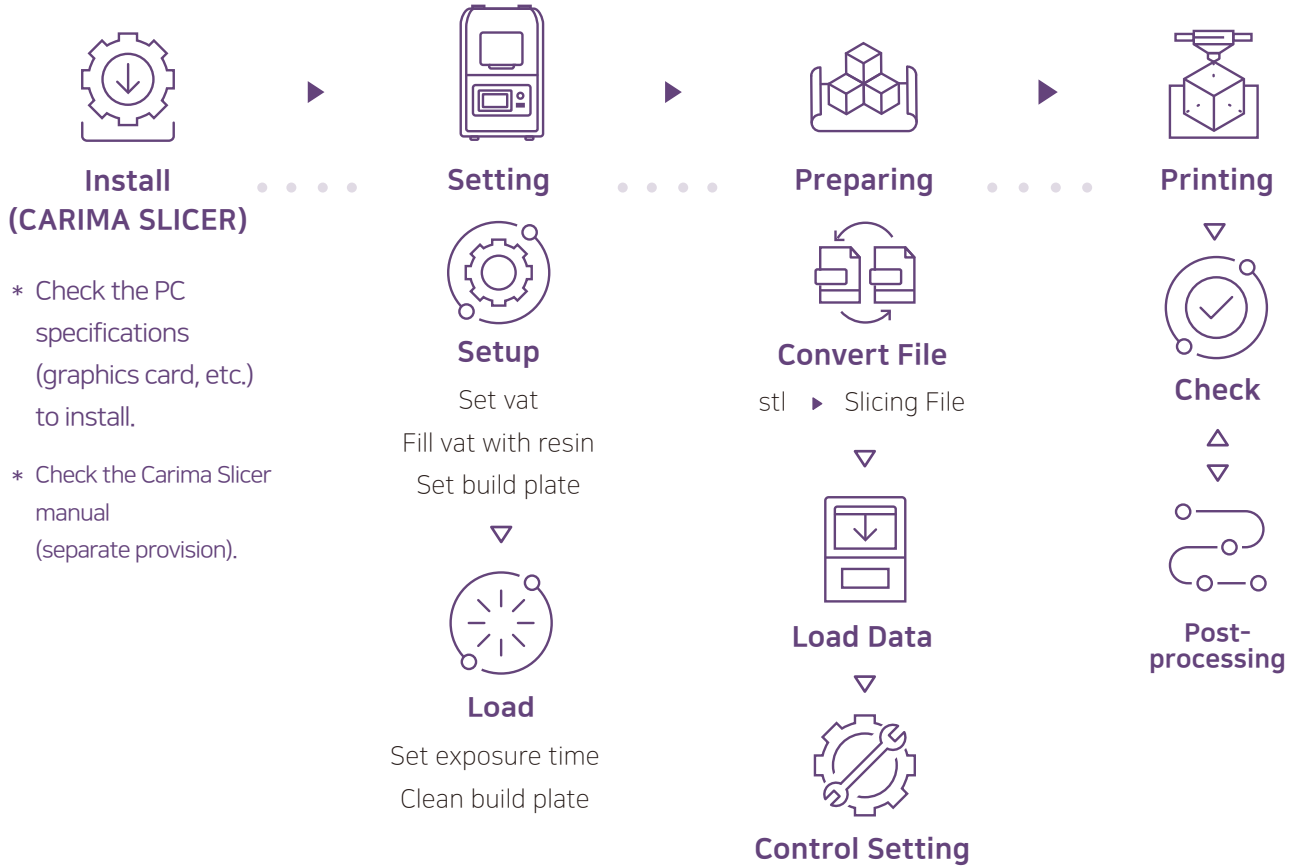
The warranty benefits of the printer will be forfeited if disassembled or modified artificially.
Carima will not be held liable for the loss caused by this.

For inquiries regarding "After Sale Service" and product warranty, please contact Carima.

Process Overview

For output, the following procedure is required.

Install (CARIMA SLICER)

* Check the PC specifications (graphics card, etc.) to install.

* Check the Carima Slicer manual (separate provision).

▶

Setting

Setup

Set vat

Fill vat with resin

Set build plate

▽

Load

Set exposure time

Clean build plate

▶

Preparing

Convert File

stl ▶ Slicing File

▽

Load Data

▽

Control Setting

▶

Printing

Check

△
▽

Post-processing

EM Compatible Resin

EM is compatible with all of Carima's general and functional resin.
* We can only gaurantee the print's outcome when Carima product is used.

General	Generally used for printing for prototype or life-size modeling.

Standard

- ● **Green**
  Code
  3DK83G
- ● **Beige**
  Code
  3DK83B
- ● **Ivory**
  Code
  3DK83I

Nontoxic CMYK / Clear

Biocompatible CMYK/W resin, being non-volatile and nontoxic, allows users to combine colors. The resin is compatible with Carima's eco-friendly detergent (RD-229), allowing it to be washed with water.
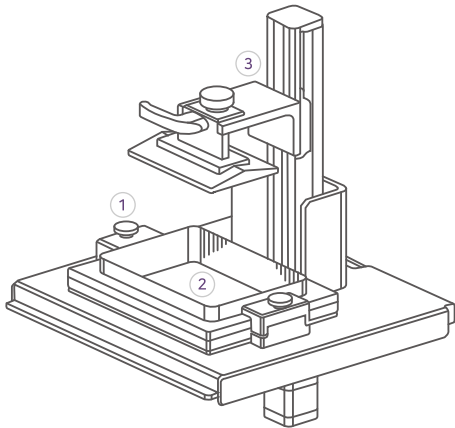
- ● **Cyan**
  Code
  CUKL22C
- ● **Magenta**
  Code
  CUKL22M
- ● **Yellow**
  Code
  CUKL22Y
- ● **Black**
  Code
  CUKL22K
- ○ **White**
  Code
  CUKL22W
- ○ **Clear**
  Code
  CUKL22CL

Preparation and Setup
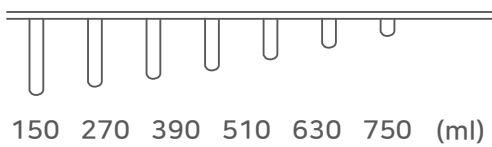
—

Printing Preparation

To start printing, you must first prepare the materials. Materials include resin vat, resin, and build plate.
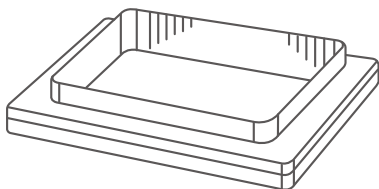

① Align the detached vat and fasten it to the vat retention knob.

② Pour the resin into the resin vat.

Resin Volume Indicator

150 270 390 510 630 750 (ml)

③ Fasten the plate to the build plate fixing base and to the module with the fixing fin.

○ **Scratching the FEP film with sharp scrapers or cutters will tear and contaminate the engine room due to leakage of resin.**

* Build plate, vat, FEP film, etc. are accessories. To purchase additional accessories, contact Carima.

○ **Information on the use of resin**

Use protective equipment when using resin. Pour resin before printing and on inevitable occasions, press the 'Pause' button and wait for a complete stop before slowly pouring the resin into the vat. Adding the resin during output can cause bubbles and adversely affect the print.

○ **Information on the use of resin vat**

The FEP film may tear or loosen during output. In this case, replace it with a new one to prevent resin leakage. It may get scratched due to user carelessness or by hardened outputs. Be aware, for it may occur in short-term use.

○ **Information on maintaining the build plate**

Clean the build plate by scraping it off with a scraper or by wiping with alcohol. Thoroughly wipe the resin off before using a different resin.
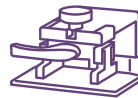
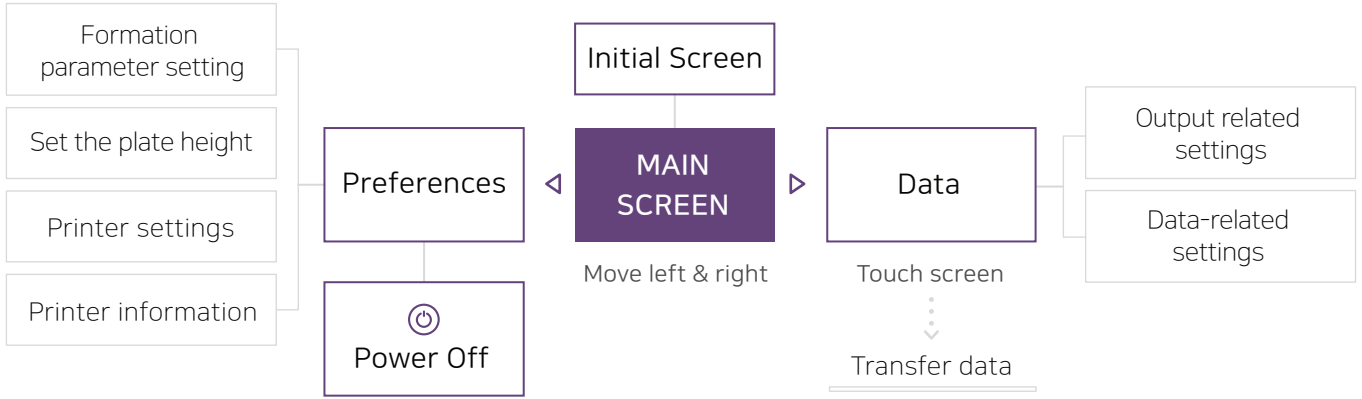

○ **Information on optical engine**

The lifespan of the optical engine lamp is 20,000 hours. When it exceeds 20,000 hours, the brightness of the lamp may decrease. Once it exceeds its usage time, improve the quality of the output by replacing it with a new lamp.

Using the LCD Panel

Use the LCD panel to set most of the settings.
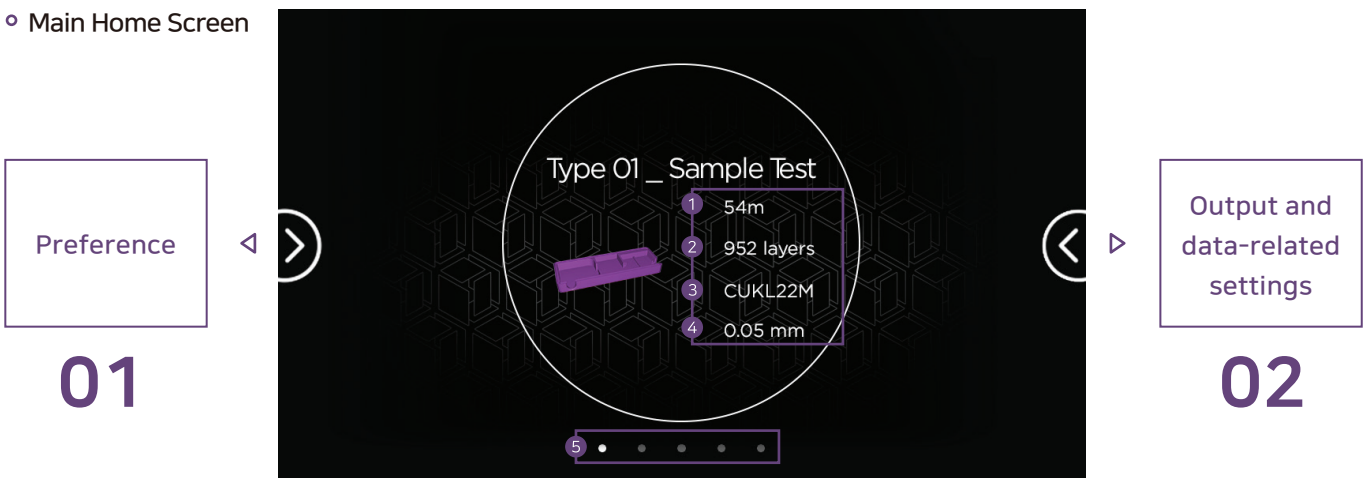

Initial Screen

When the printer is turned on, the loading screen appears. Make your ideas come true with Carima's 3D printer!
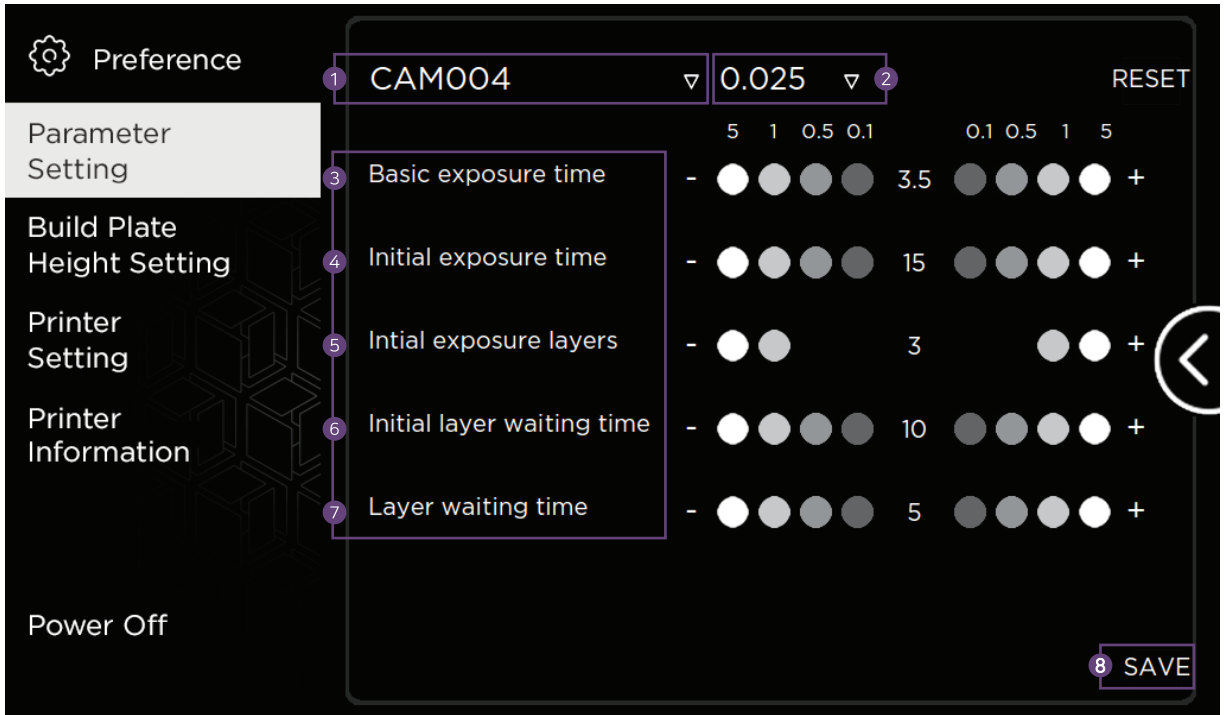
Main Home Screen

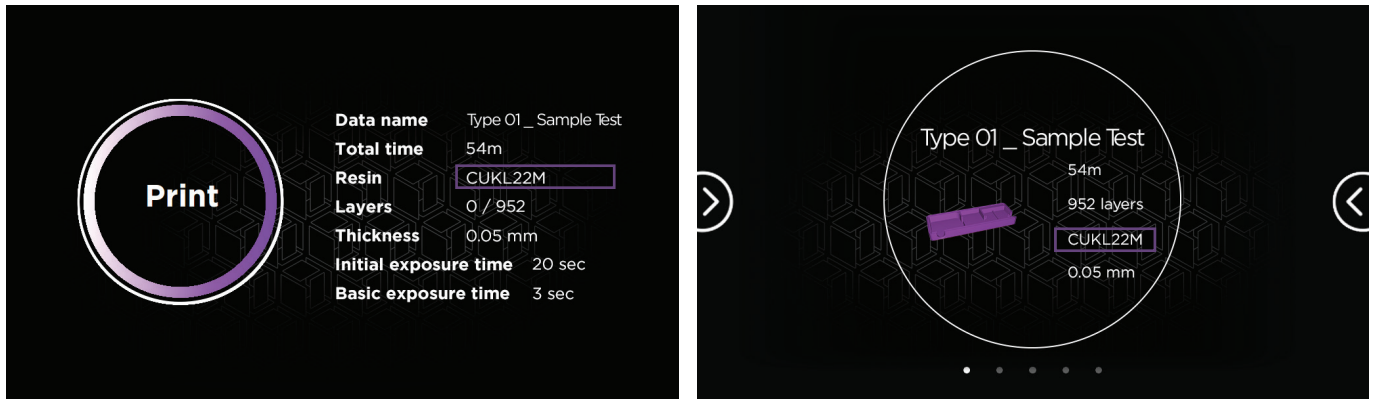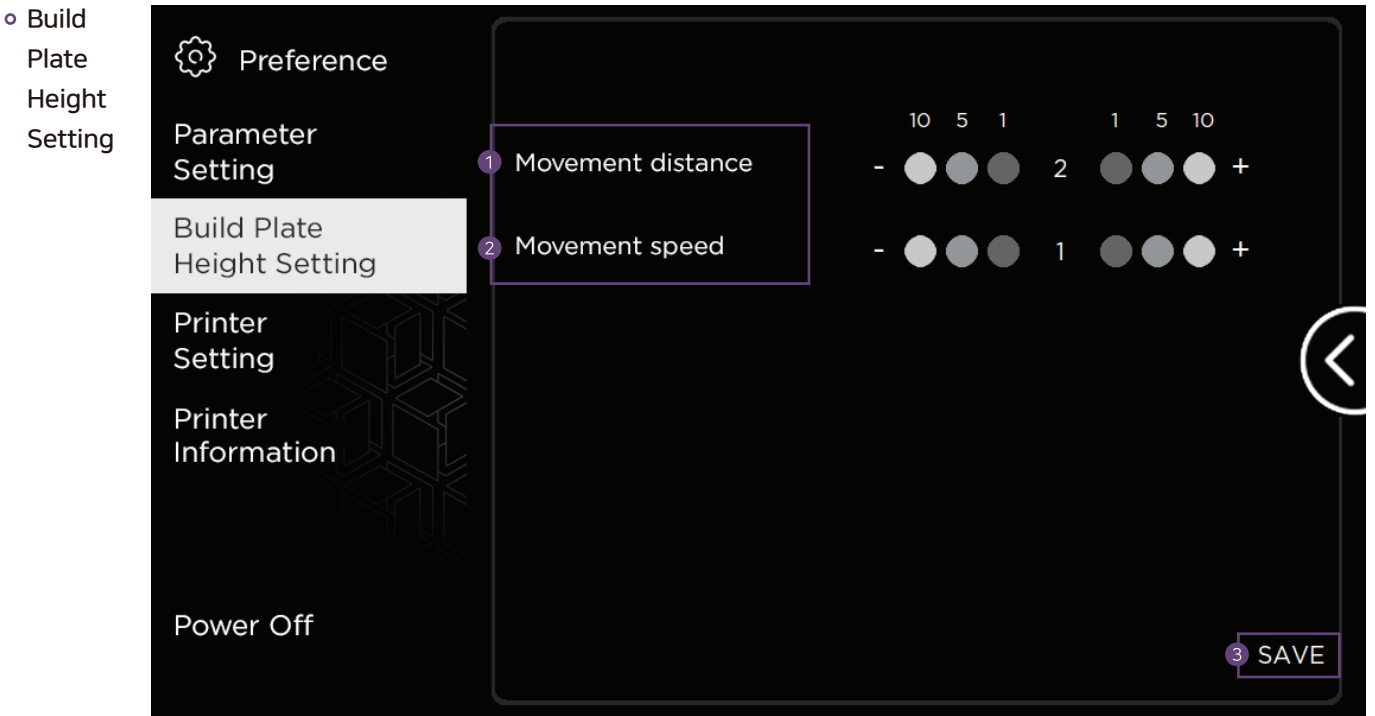| ① Total Printing Time	② Number of Layers	③ Resin Type
④ Layer Thickness	⑤ List of 5 Recent Output	

01 | Preference

○ Parameter Setting

The Parameter Setting allows you to fine-tune the light of the engine being examined for output.

① Select resin type :
Selecting the resin will automatically set the parameter setting.

② Select slicing thickness :
Change and check the parameter setting of the slicer's layer thickness.

③ Basic exposure time :
The time spent shooting the image on one layer (except the initial exposure layer) during printing; can be set in seconds.

④ Initial exposure time :
The time spent shooting the image for each layer of the initial exposure layer during printing; can be set in seconds.

⑤ Initial exposure layer :
The number of layers (starting from the first layer) to which the initial exposure time is to be applied; the number of initial exposure layer can be changed.

⑥ Initial layer waiting time :
The time it takes to flatten the resin seeping between the FEP film and the build plate at the beginning of the output; can be set in seconds.

⑦ Layer waiting time :
The time it takes to flatten the material that is seeping between the FEP film and the build plate during printing; can be set in seconds.

⑧ Save : Save the changes after changing the Parameter Setting.

01 Preference

Data name   Type 01 _ Sample Test
Total time   54m
Resin   CUKL22M
Layers   0 / 952
Thickness   0.05 mm
Initial exposure time   20 sec
Basic exposure time   3 sec

Type 01 _ Sample Test
54m
952 layers
CUKL22M
0.05 mm

Selecting the resin type on the Parameter Setting shows the selected resin on the main screen and sets the parameter automatically.

○ Build Plate Height Setting

Preference

Parameter Setting

Build Plate Height Setting

Printer Setting

Printer Information

Power Off

① Movement distance
② Movement speed

10 5 1   1 5 10
- ●●● 2 ●●● +
- ●●● 1 ●●● +

③ SAVE

Change the height movement of the build plate any time during and after printing.

① Movement distance :
Set the amount of movement of the build plate during printing.

② Movement speed :
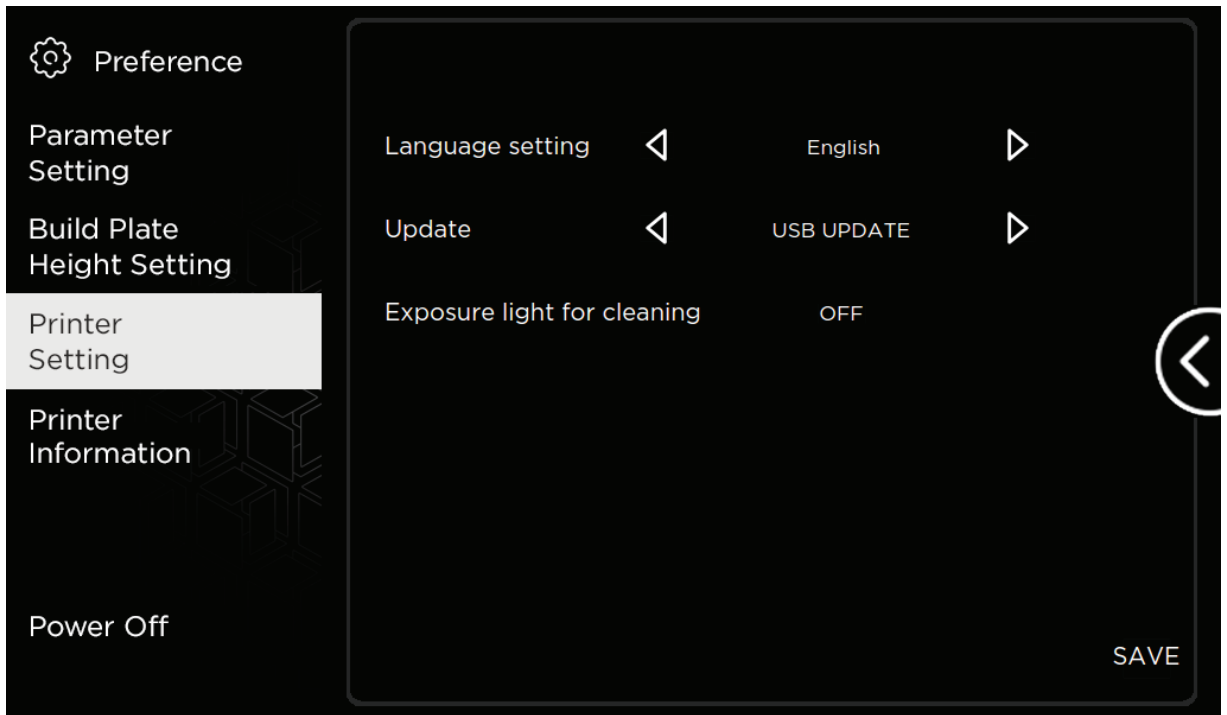Change the speed of the build plate movement while printing.

③ Save :
For changes to take effect, press save.

Build Plate Height Setting
Movement speed - ●●● 1 ●●● +
Settings have been saved
Printer Setting
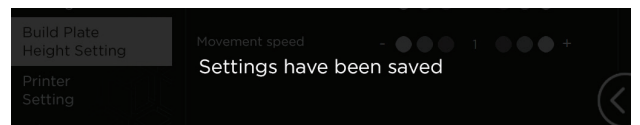
The above message will appear when saved.

01 | Preference

○ Printer Setting

Set language and printer settings, update the firmware and clean the FEP film using exposure light.

① Language setting :
Change and set language to Korean, English, Japanese and more.

② Update :
Update via firmware or via Carima's update server (online update).

*** 'Online Update' is in preparation for service.**

③ Exposure light for cleaning :
This function is used when prints fail. When turned on, UV light irradiates for 8 seconds, making small residues come into one piece.
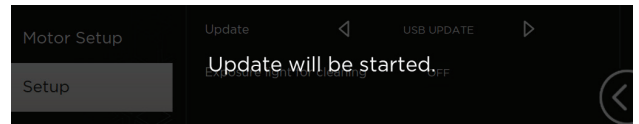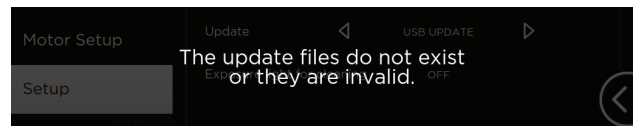
* After the light has been irradiated, the menu will switch off.

* Operate while resin remains in the vat and remove the hardened layer when cleaning is complete.
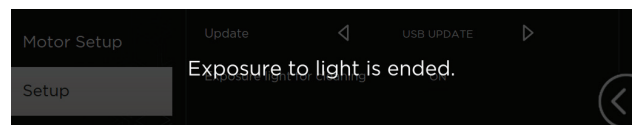
④ **Save :** Save changes.
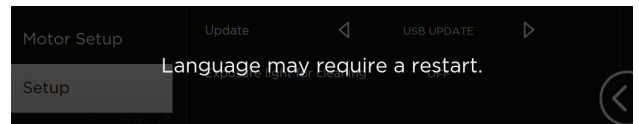
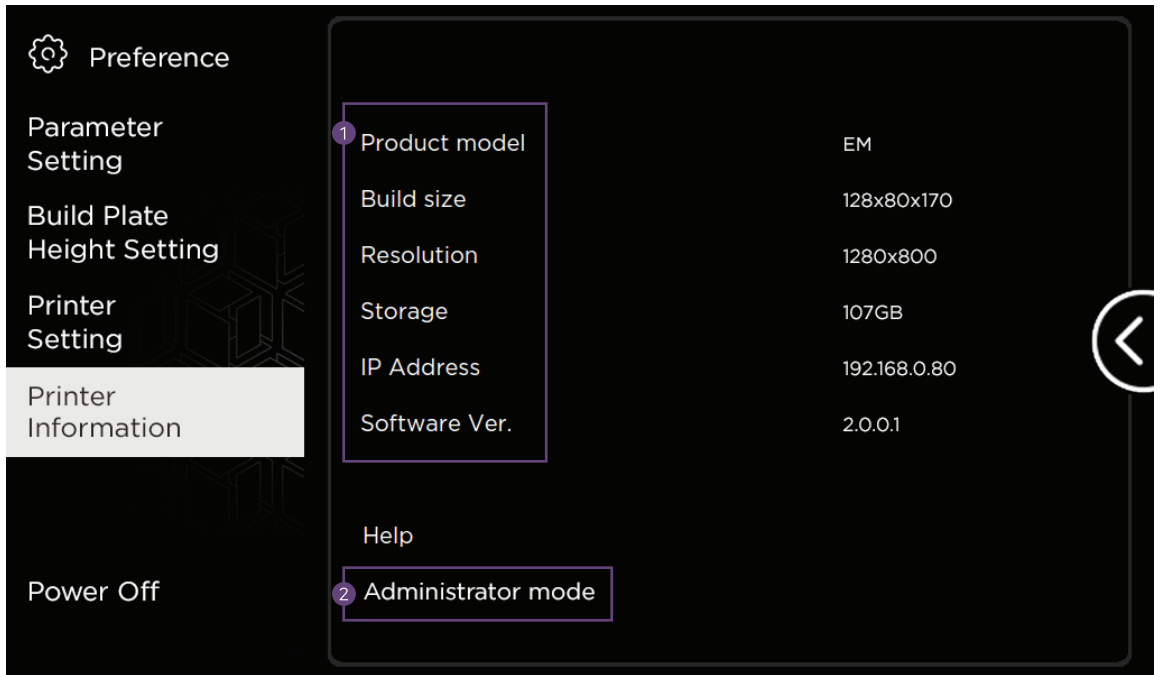The above message will appear when the language setting has been changed.

The above message will appear when updated.

The above message will appear when exposure light for cleaning has ended.

01 Preference

○ Printer
  Information

The printer information includes the model name, build size, resolution, storage space, IP address and software version.

○ Find information for product name, build size, resolution, storage space, IP address, and software version.

○ **Administrator mode :** Used only by Carima technicians during "After Sale Service." This service is not available for users. For Customer Service, contact Carima. (82-2-3663-8877)
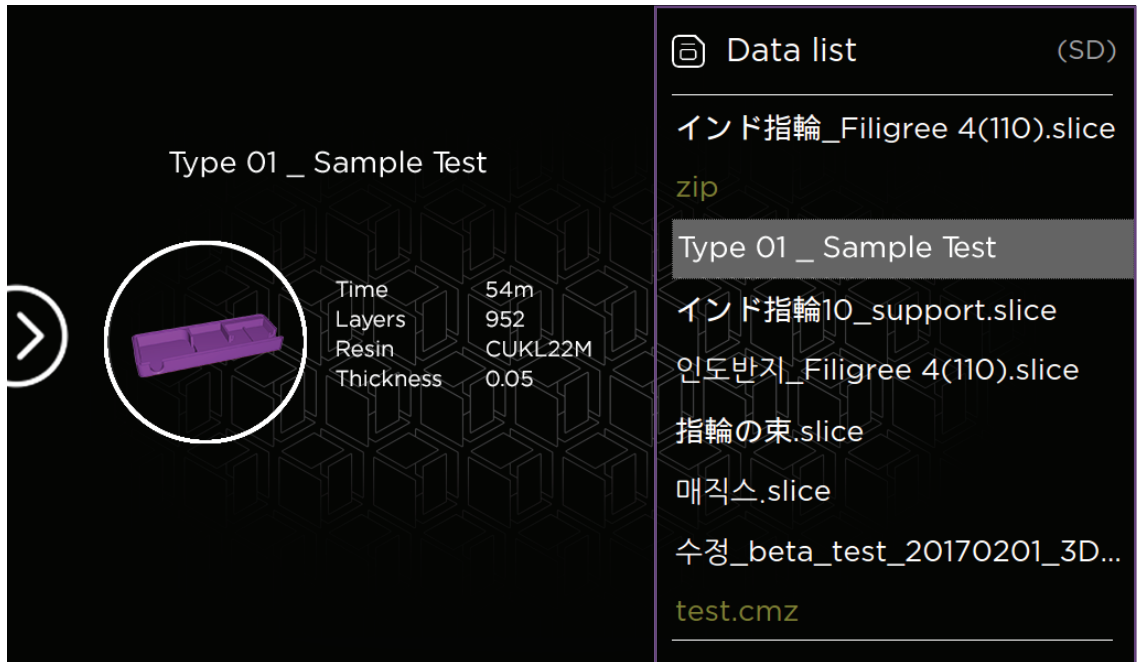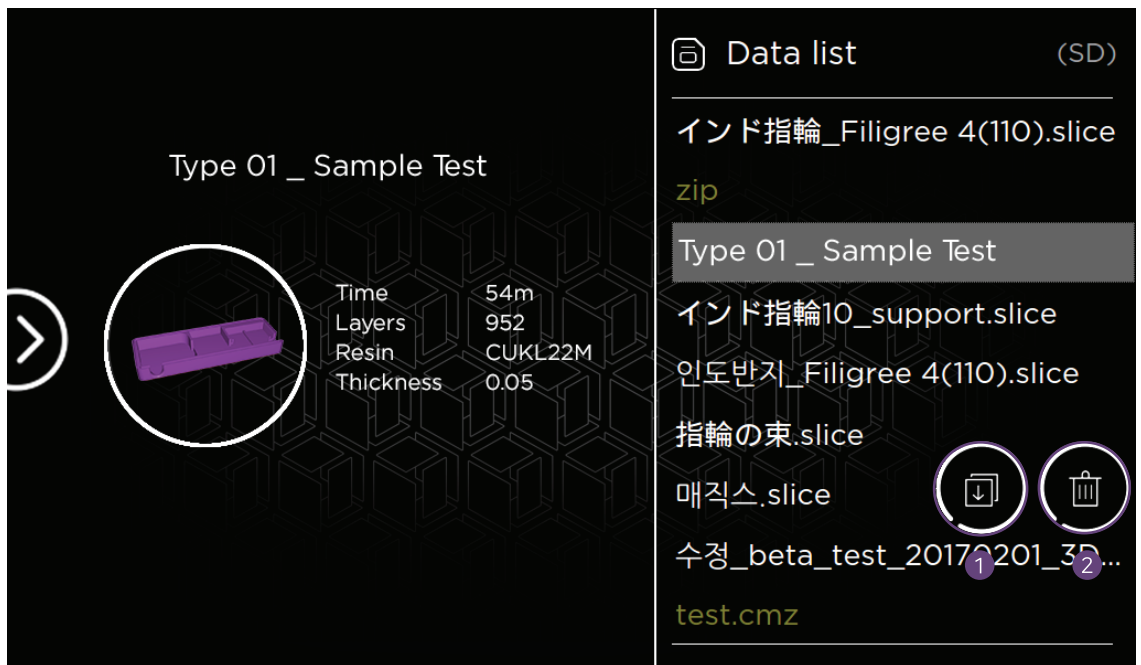

○ Power Off
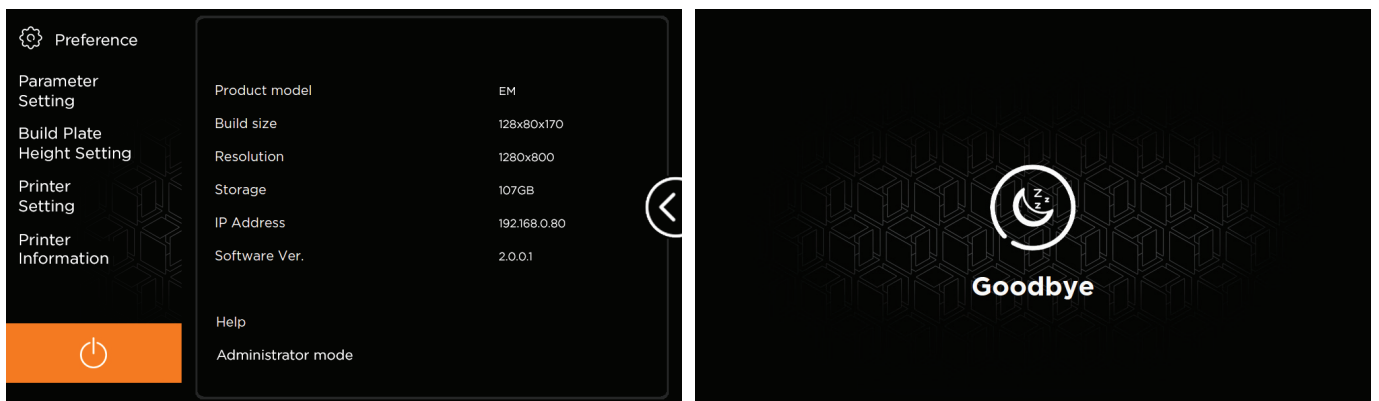
Press the 'Power Off' button twice to shut down the printer.

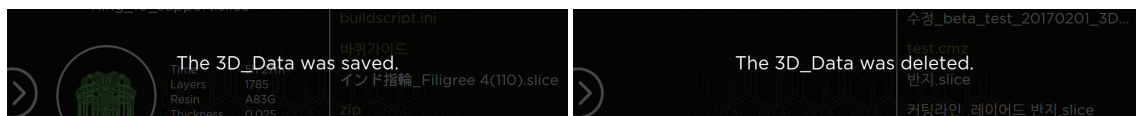## 02 Printing and data-related settings

○ Data List

Press the arrow key on the center right side of the main menu for the data list.

Click the data from the data list to either save or delete data.
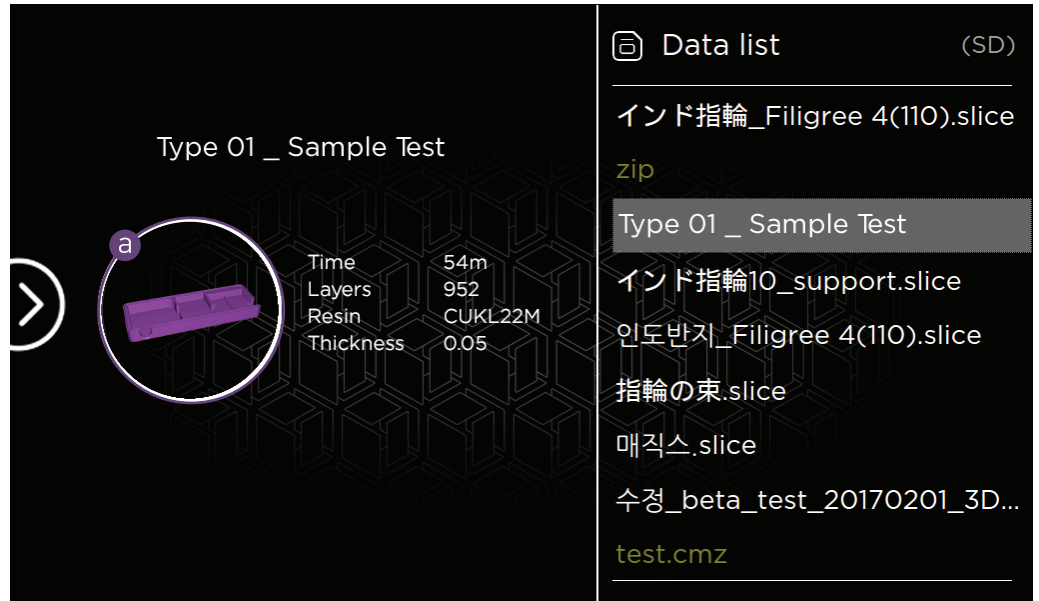

① Data saved.   ② Data deleted.

02 | Printing and data-related settings

° Printing

Click the data from the data list to see brief information about the output.

▽

Type 01 _ Sample Test

Time	54m
Layers	952
Resin	CUKL22M
Thickness	0.05

Data list (SD)

インド指輪_Filigree 4(110).slice
zip
Type 01 _ Sample Test
インド指輪10_support.slice
인도반지_Filigree 4(110).slice
指輪の束.slice
매직스.slice
수정_beta_test_20170201_3D...
test.cmz

Press the round ⓐ button to load the data.

A message appears before printing.

You must press the screen to go on to the next step.

▽

please check and remove the 3D Model on build plate.

Data name	Ring_10_support.slice
Total time	
	A83G
Layers	0 / 1785
Thickness	0.025 mm

Print

100%

Loading.

The printing starts.

Print

Data name	Type 01 _ Sample Test
Total time	54m
Resin	CUKL22M
Layers	0 / 952
Thickness	0.05 mm
Initial exposure time	20 sec
Basic exposure time	3 sec
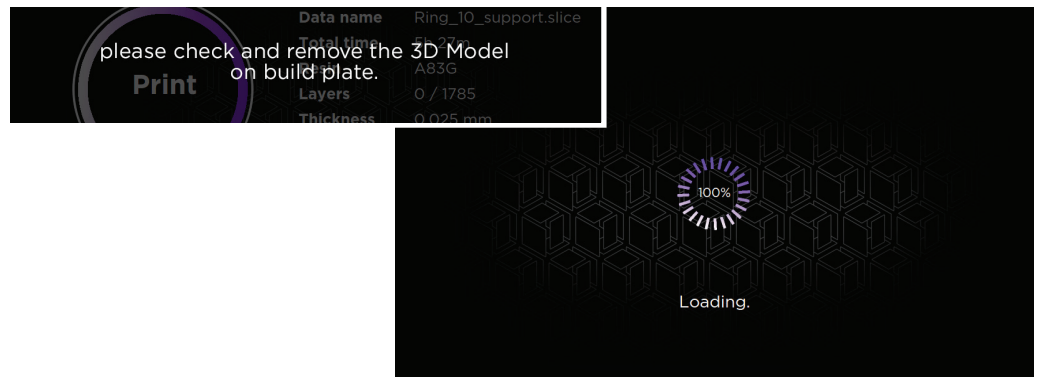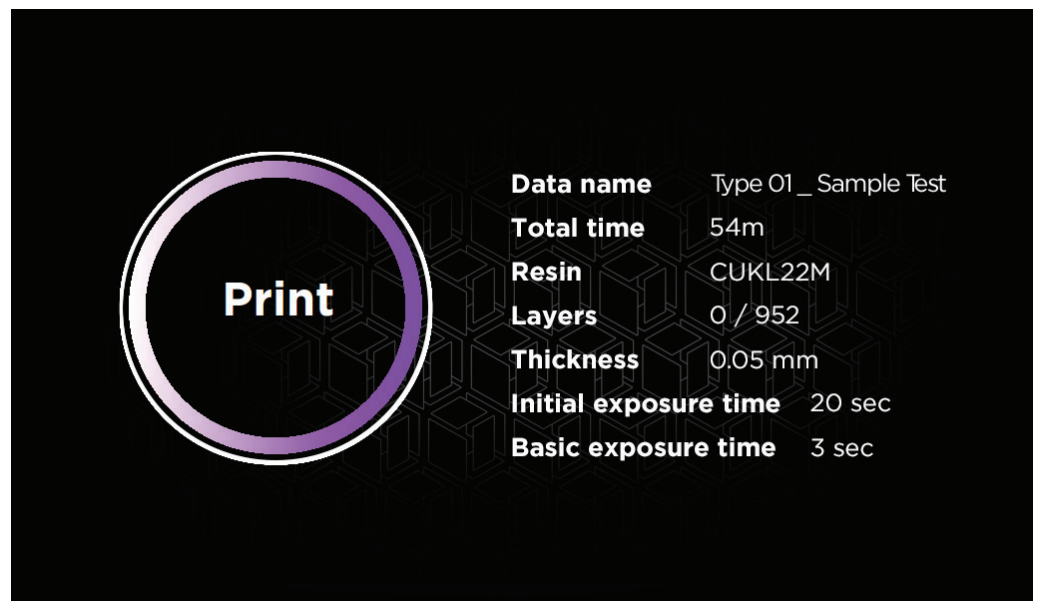
02 | Printing and data-related settings

○ Settings During Output

Press the round 'Print' ⓐ button during output to see the setting menu.
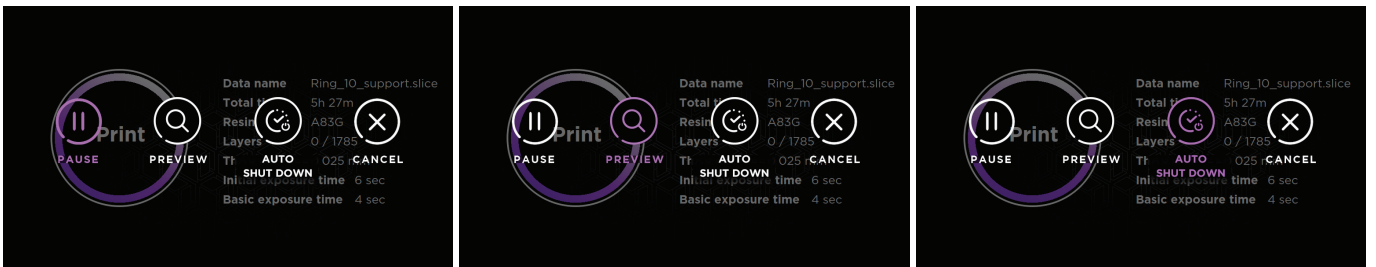
①

Select to pause the print and
press again to start the print.

②

Select to stop the print
and preview the output.

③

Select to automatically shut down
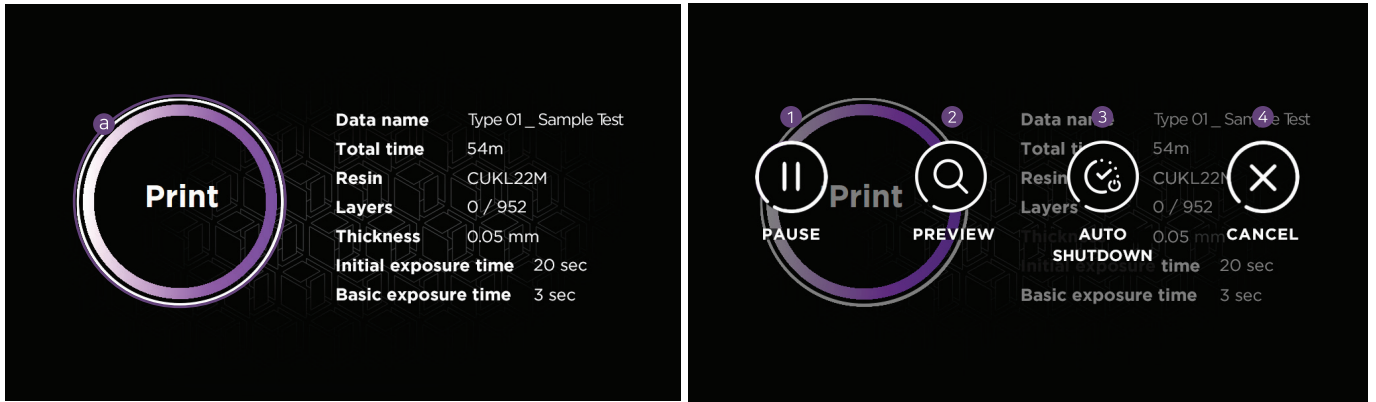once output has ended.
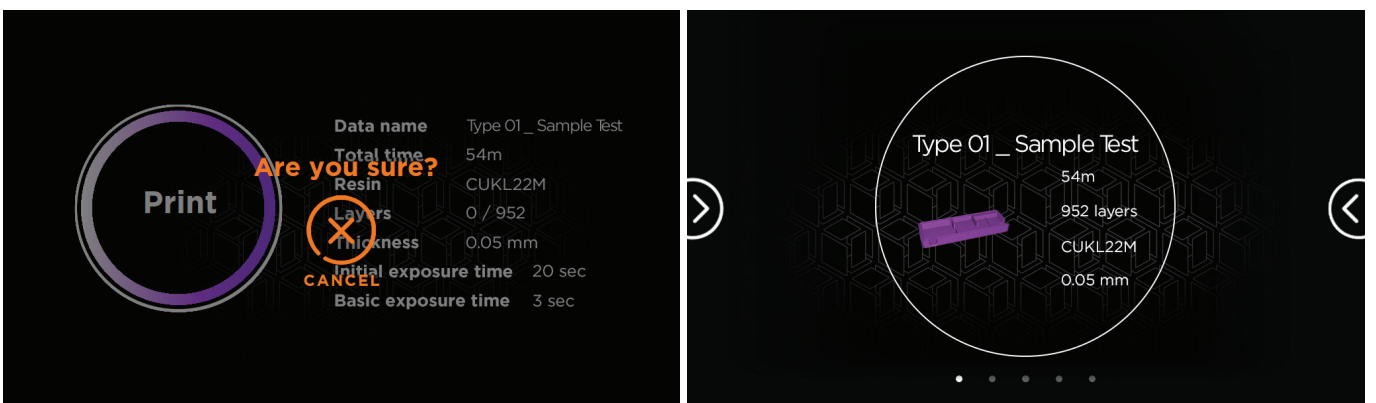
④

Select to stop the
printing process.

⊕

The main screen after output cancellation. Operate
environment setting and recall data through this screen.

*** Go straight to the screen of the corresponding output
through the Print Shortcut Menu to view previous datas.**

Finishing Prints

◨ Once the print is completed, remove the output from the build plate.
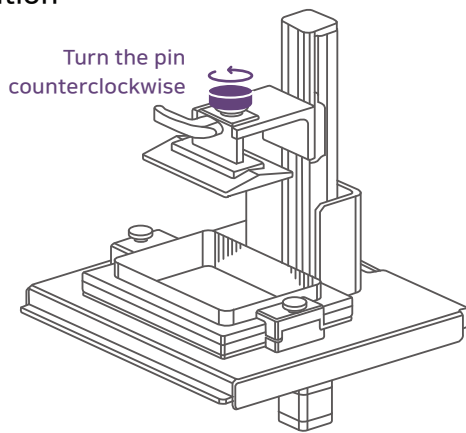 Wear nitrile gloves when removing the output.

Demounting

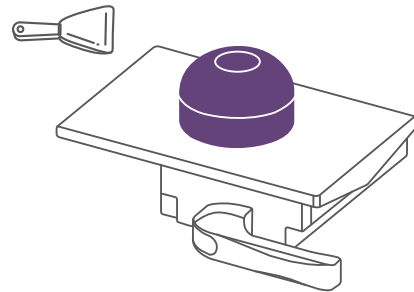When the print is complete, remove the output from the build plate.

01
Separation

Turn the pin
counterclockwise

Once the print is completed, the plate moves up.
Rotate the build plate fixing pin counterclockwise
to remove the build plate.

02
Demounting

Remove the build plate upside down, to prevent the
remaining resin from falling. To prevent damages,
carefully use the scraper provided to remove the output.

* Be careful when using the cutter and scraper.

Post-processing

After removing the output, post-processing such as washing, drying, removing the supporters and curing has
to take place. Wear nitrile gloves and remove the prints.

01
Washing

○ The resin remains when the output is completed. The remaining resin can be cleaned with
alcohol(IPA, 95% or higher). The higher the alcohol concentration, better the wash.

*** Washing can be done through soaking the outprint in alcohol or by using a sprayer with
alcohol. Be aware, for the output should not be in alcohol for more than an hour.**

○ For detailed wash, use thin brush to remove resins.

○ Use eco-friendly detergent or water when using Carima's Nontoxic resin(CMYK/W).

* Use protective equipment when using toxic alcohol(IPA).

02

Drying

After cleaning with alcohol, dry the output with an air compressor or let it dry naturally.

* The air compressor is not sold in Carima.

* Take caution while using the air compressor, for it may damage the output.

03

Removing supporters

◁ **Character "Ttota"
Source : Seoul Metro**

Seoul Metro

Remove the supporter by hand from the plate after post-processing.

If cured without removing the supporters,
use the nipper to remove it.

04

Polishing

If parts of supporters remain on the output after removing it off, you may use sandpaper to smoothen the surface.

05

Curing

* Do not look directly into the UV when using the UV curing. Wear glasses or goggles to protect your eyes.

Be aware, for excessive curing affects the output.

* The type of curing machine and time may affect the curing process.

Curing frequently and multiple times will reduce the transformation of output than curing long period of time at one session.

CARIMA CURING MACHINE

CL300pro

CL300pro

Lamp	UV LED 300W (Adjust Steps 1 - 20) Recommend to use step 12-15

	External	Internal
Product Size (mm)	283 X 283 X 337	Ø150 X 110 (Full base 125x110)

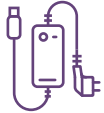|	
Cooling System	Air Cooling
Power	AC110-220V 50 / 60Hz, 5A

Maintenance

◩ To use the printer for a long time, be informed on maintanance and FAQs.

Maintaining the Printer

To use the printer for a long time, It is important to keep the printer in a good condition.

○ If the printer is not in use for a long period of time, unplug it and store it in a shady area.

○ If the resin leaks into the printer, wipe it with alcohol.

○ **If the engine lens is damaged, it can adversely affect the print quality. Contact Carima for technical help.**

Maintaining Other Accessories

Basic printer accessories include resin vat and resin.

01 Managing the Resin Vat

To remove the leftover resin and/or to use other resin type, completely remove the resin from the vat with the provided syringe. Then wipe the vat with alcohol.

We recommend using individual vats for each type of resin. Due to material properties, the resins are hard to remove completely. If different types of resin mix together, the print quality may be affected.

If residue remains on the resin vat
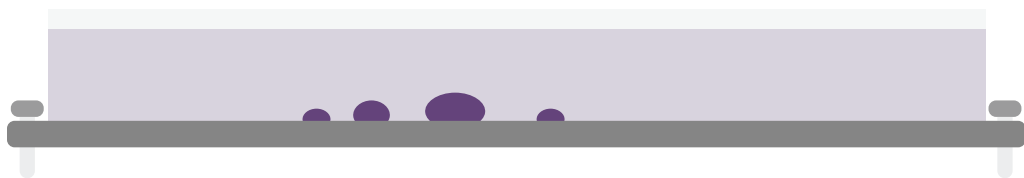
○ Wear nitrile gloves and remove the residue by hands.
When using the scraper to remove the residue, be careful to not damage the FEP film.
(We do not recommend using the scraper directly on the FEP film.)

○ Use the 'Exposure light for cleaning' function (Preference>Printer Setting / Manual page 10) to remove residue.

---

02 Maintaining the Resin

○ Resins are vulnerable to sunlight and other lights. Store it in a shady place to use the printer for a long time.

○ Do not mix different types of resin.

* Be aware of resin getting into your eyes for the resin is composed of chemical.

○ To store the leftover resin, take the the resin-filled vat out from the printer and use the resin bottle or light-blocking item such as foil to store in it.

* The resin has chemical odor which may affect your respiratory. Always use goggle or sunglasses, mask and gloves for protection.

* Do not mix different types of resin when storing the resin back into the bottle.

03 Disposing of Resin

Types of General Waste

Household chemicals such as used soaps, detergents, etc.

Solid wastes that have been printed

Chemical-free tissue and paper

○ Disposal of Waste

If you have a purification device, dispose in it, otherwise, **it should be entrusted to the waste disposal company.**

○ Disposal of Output

If it corresponds to general waste, it is treated as general waste without being entrusted to the waste disposal company.

○ ⚠ **Disposal of Hazardous Waste** ⚠

Must be entrusted to waste disposal company.

04 EM Tool Set

EM Tool Set will be available when EM is purchased. These set of tools will be useful when using the printer.

Contact Carima for additional purchase of EM Tool Set.

Scraper	Silicone scraper	Funnel	Nitrile gloves	Wrench set
Washing tub	Syringe	Measuring cup	Tray	Material
Nipper	Adapter	Power cord	USB / Key	Check list

*Components and tools may be changed or replaced by other items.

FAQ   Most asked questions while using Carima's printer.

Q. **The engine won't turn on.**

A. Turn off the power and then turn down the switch located at the back. Wait for at least 1-3 minutes and then turn it on again. If the power does not turn on, contact Carima.

Q. **How much resin do I need?**

A. Pour as much resin as necessary every time you use the printer. Filling the vat with 1/3 of resin will be sufficient.

Q. **The printer is not printing.**

A. Check if the engine light is on and set the exposure time again. If it doesn't print, contact Carima.

Q. **How long can I store the resin?**

A. After opening the resin, the warranty period is up to 6 months. Keep the resin away from light exposure, as it can cure when exposed to it.

Q. **If the output falls while printing, what do I do?**

A. Stop the operation and turn off the engine, take out the vat and filter out the residue. Take caution when taking it out, for the resin on the build plate may fall on the engine.

Q. **The slicing file I've uploaded has a different resolution.**

A. If the resolution of the device is not correct, it will not print. Be sure to check the resolution and build size of the device in 'configuration' before slicing.

Q. **How do I clean the vat?**

A. Check for residue in the vat. To remove the leftover residue, filter out the resin in the vat separately through the funnel and the sieve net. Lightly wipe the resin inside the vat with tissue paper and alcohol. Make sure that the resin and alcohol do not get into the vat's gap.

* You can also use the 'Exposure light for cleaning' to remove residue.

Q. **How do I manage the printer when it is not in use?**

A. The resin vat of an unused printer should be emptied and cleaned with alcohol. Unplug the printer and store it in a shady area, away from rain, wind and sunlight.

Q. **What is the difference between "crv" and "stl" files?**

A. The crv file is the default file by carima slicer. Supporter and models are recognized separately and stored so that they can be modified at any time when the supporter work is completed and saved. In the case of the stl file, supporters are saved as one mass with the model and cannot be modified after saving.

**CARIMA FLAGSHIP
DESKTOP 3D PRINTER**
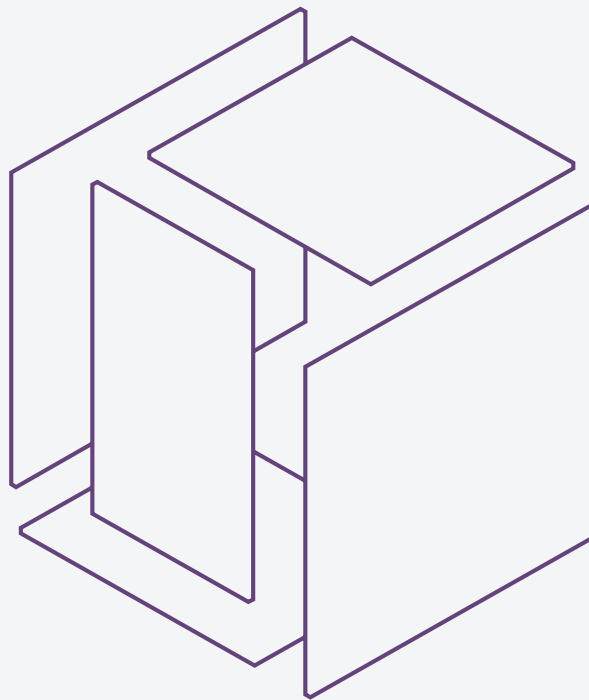
carima

EM Manual V1.0 I 2021. 01. 13

Products and other inquiries

9:00 – 18:00 UTC+09:00 (Mon - Fri)
Tel. 82-2-3663-8877 I sales@carima.com

1301, 551-17, Yangcheon-ro, Gangseo-gu,
Seoul, Republic of Korea