
MAKERFORGE



InkSmith Makerforge

Thank you for purchasing the InkSmith Makerforge!

Features

- Originally assembled in Korea, the Makerforge is built from a modular design which allows for quick repairs and troubleshooting.
- The modular design also allows for quick change of parts if needed.
- High print stability.
- Triple layer air filter removes most particles and odor.
- Auto-leveling and heated bed.
- 5-inch color touch screen.
- Wi-Fi, USB, and local storage options for sending your print file.
- Power failure protection
- Code SPE-1000 eSafe Evaluation

This user manual explains the entire process from the installation to the model printing in steps. In order to use and become familiar with the new features and technology that are offered exclusively by the InkSmith Makerforge 3D Printer, be sure to read this user manual thoroughly even if you already have plenty 3D printer experience.

InkSmith Limited. shall not be held responsible for loss due to any errors in this document, provision of this document or use of this document.

Supplier's Declaration of Conformity (SDoC)

Product Name	3D PRINTER
Model Name	InkSmith Makerforge - OPTIMUS-C23
FCC Rules	Tested to comply with FCC PART 15 SUBPART B
Operating Environment	For home, office, and classroom use

FCC COMPLIANCE STATEMENT:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

INFORMATION FOR THE USER:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area can cause interference to other devices. The user will be required to correct the interference at their own expense.

CAUTION :

Any changes or modifications not expressly approved by the manufacturer responsible for compliance could void the user's authority to operate the equipment.

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1. Service & Safety

Service

If there is a problem that is not specified in this document, please contact us through:

Tech Support Page

www.inksmith.ca/pages/tech-support

Email

tech@inksmith.ca

Phone




1-844-465-7684 ext. 4

When requesting a warranty service, please write down the following information for smoother and faster processing of the task along with the request.

- Customer (School/Company/Individual)
- Brief summary of the issue
(If you take a picture or a video of the situation when a problem occurs or the internal LCD screen of the printer and sent it to us, it can be processed more promptly.)
- Serial No. → It can be found on the label on the rear of the product.
- Firmware Version: It can be viewed in [Setting\(System > Information\)](#)
- UI Version: It can be viewed in [Setting\(System > Information\)](#)
- Address
- Phone Number.
- Name of person to contact

Safety Precautions

Before using the printer, be sure to read this ‘Safety Manual’ and follow these guidelines. Following these instructions will prevent user injury, third-party harm, and damage of the printer. Failure to comply with these instructions may result in a serious injury or damage to the printer.

	Warning: Failure to comply may cause a serious injury or property loss.
	Caution: Failure to comply may cause injury or property loss.
	Note: Useful tips or additional information.



Connect the printer only to the power outlet with a ground connection.



Since high heat is generated while the printer is operating, there is a risk of burn if a body part or an object is inserted into the printer while it is operating. If there is a need to insert a body part or an object into the printer, make sure to fully cool it down after stopping the operation completely.



Since high current power is applied to the heating bed, be cautious about an electric shock when touching the bed (especially when touching the power supply module of the bed).



The printer uses moving parts such as a motor, belt, gears, and fans. There is a risk of injury due to jamming if a body part or an object is inserted into the printer while it is operating.



Since there is a risk of fire or shock if water, other liquid, a piece of metal or other conductive substance gets into the printer, be cautious. Also, since there is a risk of fire or electric shock, do not operate it with a wet hand.



Since there is a risk of injury to children or pets by the printer, be cautious about where the printer is set up. Adult supervision is required.



The printer and accessories include parts with sharp edges. Be cautious about potential injury to yourself or damage to the printer.



Since filament, the material used in the printer, has a risk of fire or injury, do not attempt to heat it with other devices or deform it. Also handle it with care since there is a risk of choking on small parts, prints, or excess filament.



Since there is a risk of fire/explosion if a volatile material is used in the printer, make sure not to use it. Also, since there is a risk of fire if an ignitable or flammable substance is left unattended around the printer, remove it.



Do not damage or deform the power cable, and do not supply power that is outside of designated voltage.



When moving the printer, remove the power cord and cables while the power switch is turned off after the printer operation is stopped and the temperature of the internal parts cools down sufficiently.



Do not use the interior space as storage as this can damage the printer.



Do not turn off the power when the heating bed or the extruder is still heated. Since the cooling fan can't be operated, the device may break down or a fire may break out due to the high temperature.



Since the printer uses a material after melting it, a peculiar odor may be generated during the process. Therefore, be sure to install the printer in a well ventilated place.



Do not install the printer outdoor or in a place under direct sunlight or a place with a lot of vibration, humidity, and dust.



Do not install the printer on an unstable surface. It is best practice to place the printer on a sturdy, flat and level table. Also, remove anything around the printer which can be damaged by the heat or vibration of the printer during operation.



If filaments or parts that are not supplied by our company are used in the printer, it may cause damage to the printer, or the quality can't be assured. Issues after modification to the printer may not be covered by InkSmith's warranties.

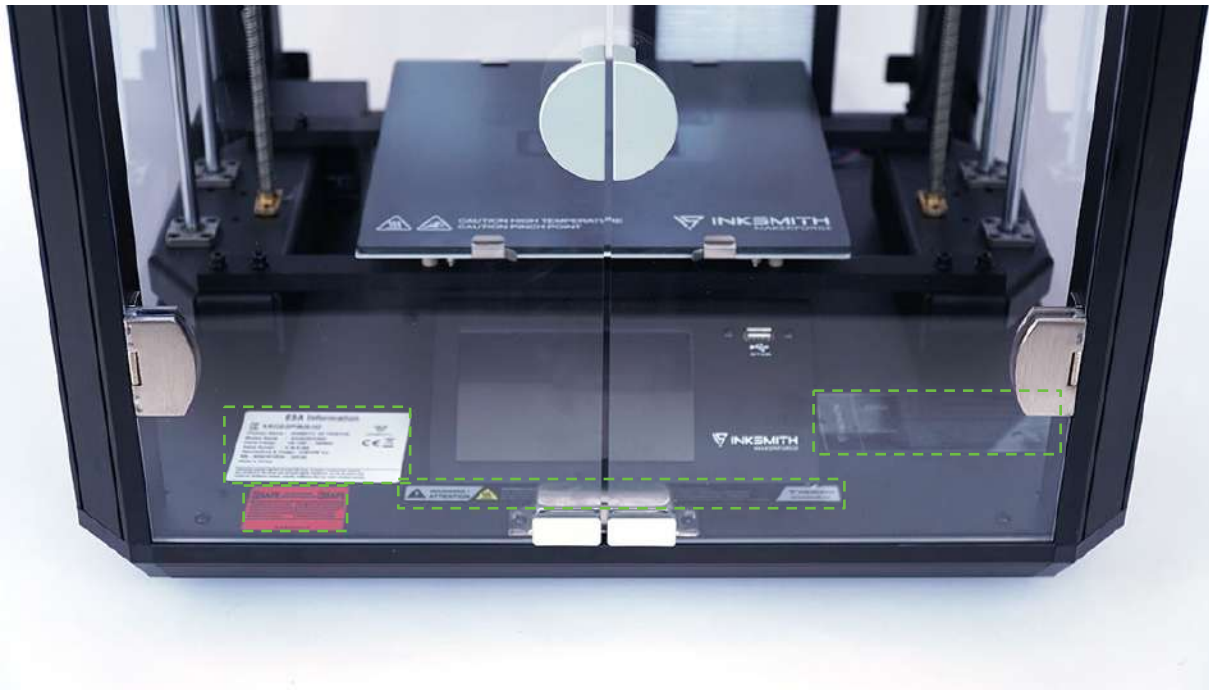


Do not arbitrarily disassemble or modify the printer on user's own, except with parts that have been approved in the user manual. Failure to comply may cause an injury or damage to the printer, and problems that may occur are exempted from the free warranty coverage.



Do not apply an excessive force or a shock to the printer. There is a risk of breakdown, damage, or injury. Also, read all cautions in the user manual carefully before using the printer.

Location of Labels



	<p>Heating Bed and Moving Parts Warning</p>	<p>If the heated bed is touched during the operation, there is a risk of burns due to the high temperature. Hazardous moving parts may result in hand or finger injury.</p>
	<p>ESA Information Label</p>	<p>List's the product specification according to the Safety Control Act.</p>
	<p>Caution Label</p>	<p>General cautions and best practices. Includes basic warranty information.</p>
	<p>ESAFE Label</p>	<p>The Makerforge is evaluated to the Model Code SPE-1000.</p>



Since high current power is applied to the heating bed, be cautious about an electric shock when touching the bed (especially when touching the power supply module of the bed).

Cautions About Using the Printer






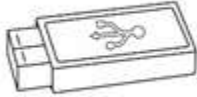
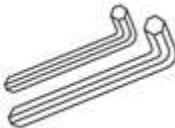

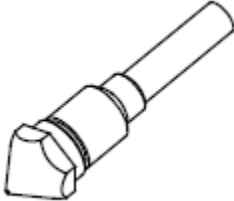

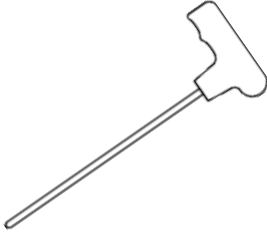
Before using the printer, please read this section and follow the instructions.



Filament	<p>Use high quality filament, like PLA+ sold by InkSmith. *If an issue were to occur because of 3rd-party faulty filament, it would not be covered by the warranty.</p> <hr/> <p>After opening a roll of filament, use it up first unless taking the proper storage practices. When storing filament, make sure to secure the filament so it doesn't unravel and is sealed away from moisture.</p>
Mounting and Unmounting the Filament Spool	<p>When mounting or unmounting the filament spool from the printer, be careful not to let the filament unravel from the spool.</p>
Filament Replacement Loading	<p>When loading or replacing the filament, remember to let the extruder heat up fully. *If the temperature is not set correctly, the extruder may clog, or the filament may crack.</p> <hr/> <p>Be careful about the temperature setting and sufficiently remove the previous filament inside the nozzle when replacing it with a new filament.</p> <hr/> <p>If the tip of the filament is bent or folded, trim the end on an angle so there is a point and can be fed easier into the extruder. *If the shape of the tip isn't right, it may not load properly, making a ticking sound in the feeder or extruder during feeding.</p>
Heat the Extruder and Heating Bed	<p>Remember to set the correct temperature settings for the nozzle and heated bed to the filament's rating.</p> <hr/> <p>Attempting to print outside of the filament's temperature range, either above or below, may cause printer failures, low quality printing, and print failures such as cracking or gaps.</p> <hr/> <p>The print should only be taken off when the bed has cooled down sufficiently. The print will just pop off when the bed is cool enough so do not apply excessive force to remove the print as this may damage the bed's special coating.</p>
Cleaning of the Extruder Nozzle	<p>Remember to regularly check the extruder and clean to nozzle. *Replacement of a nozzle that has been worn out in due to regular use is not covered by our free warranty.</p> <hr/> <p>Carefully clean the outside of the nozzle with the provided wire brush after heating up the nozzle.</p> <hr/> <p>Repetition of cooling and heating of the nozzle while the filament is inside of it is could cause a filament jam.</p> <hr/> <p>Assembly/disassembly must be completed only when the power is turned off (Power OFF).</p>

Assemble/Disassembly of the Extruder Module	Do not shut off the power while the extruder module is heated. (If the extruder module is separated immediately after the power is turned off for repair or replacement, that is allowed.)
Cleaning of the Heating Bed	<p>Clean the heating bed with a dry cloth and the careful use of a scraper. *Replacement of a heating bed with a damaged coating from regular use is not covered by the free warranty.</p> <hr/> <p>If the bed is quite dirty, only clean it with high purity acetone. *Many cleansers (wet wipes) may contain a chemical that could damage the coating on the bed, so it is best not to use them.</p>
Auto Leveling	<p>If an error occurs during Auto Leveling, check whether the nozzle accurately contacts the heating bed, and retry after cleaning the heating bed and the tip of the nozzle (Cleaning with a wire brush is recommended). If the error continues to occur, refer to https://inksmith.ca/a/help or contact support.</p>
Preparation for Requesting a Warranty Service	<p>If an issue occurs, make note of the print file and take a photo or video of the part of the printer with the issue and the LCD screen. Insert a USB memory stick and save the recent logs. To do this, go to Settings -> System -> System Log, and send it to InkSmith Tech Support if asked.</p>
Saving System Logs	<p>After inserting a USB drive, save the most recent logs by going to Settings -> System -> System Log and send it together.</p>

2. Components & Preparation for the Use

Components and Accessories

		
<p>3D Printer Main Body</p>	<p>User Manual</p>	<p>Power Cord</p>
		
<p>Filament</p>	<p>8mm Box Wrench</p>	<p>USB Memory Stick</p>
		
<p>Three Types of Wrenches ($\Phi 2$, $\Phi 2.5$, $\Phi 3$)</p>	<p>Flat Pusher</p>	<p>Nozzle Kit</p>
		
<p>Spool Holder</p>	<p>Push Rod</p>	

	<p>If filaments or parts other than the ones supplied by InkSmith are used, it may cause damage to the machine. These issues are not covered by the Makerforge Warranty, so it is best practice to only use InkSmith approved supplies.</p>
	<ul style="list-style-type: none">• A filament spool and a clean filter are included in the box, but are packed separately without being assembled in the printer.• Types and specifications of the accessories that are included in the product can be changed without prior notice for the purpose of improving the product.• If you want to purchase additional accessories, visit our website or contact sales@inksmith.ca for inquiry.• Since the accessories (not the Makerforge 3D Printer) are provided for the user's convenience, accessories are not covered under the warranty.• Nozzle/Heating Bed/Teflon tube among the printer's parts that are normally worn down during use are considered consumables.• Material and color of the initially supplied filament are supplied in random.• The manual and CuraForCubicon are contained in a USB memory stick. More resources can be found online at InkSmith.ca

Packaging Unboxing



When opening the packaging and setting up your printer, be careful not to apply too much force or tear the packaging.



When opening the packaging, be careful not to damage any of the cables.

- ① Place the box on a flat surface like the floor, open the box, carefully remove the packing material on the top. The glass printing bed is in this layer of material so do not throw it out.



- ② After removing the packaging, raise the lid and grab the frame of the printer from the top to lift the printer out of the box. Either set the printer back onto the floor and lift again while grabbing the bottom of the printer or place the machine directly in the place it's going to stay.

Since lifting the machine by holding the top frame, as shown below, may distort the machine, try not to do so as much as possible, and move the product by holding bottom. If lifting by the top, remember to reach farther in so you're holding the frame and not just the sheet metal.

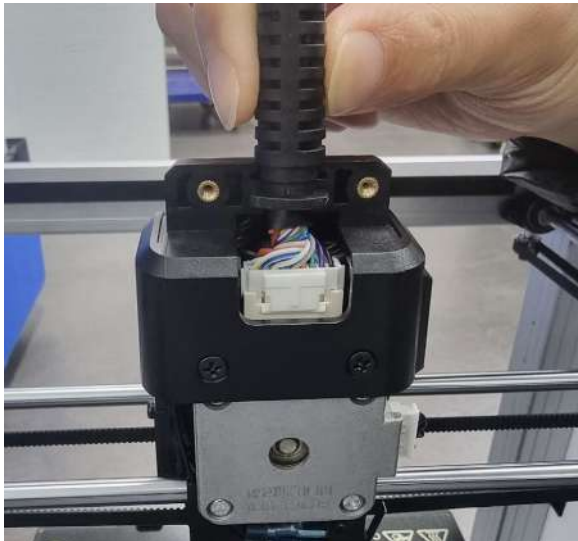


③ Remove tape and the film that protects the acrylic during transit. (There may be tape in places that are not shown in the picture.)

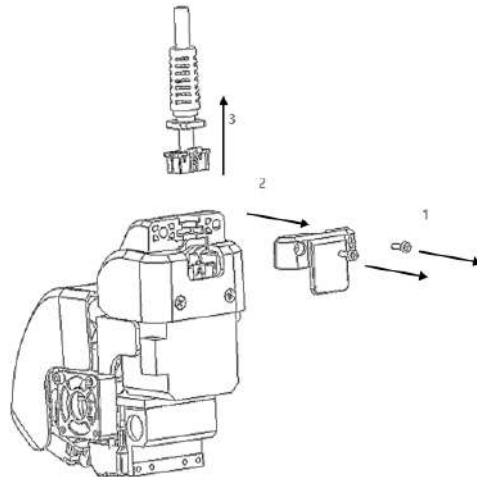


④ Mount the extruder cable [if necessary].

① Assemble and fix the extruder cable fixing holder by turning it clockwise as shown in the picture below.

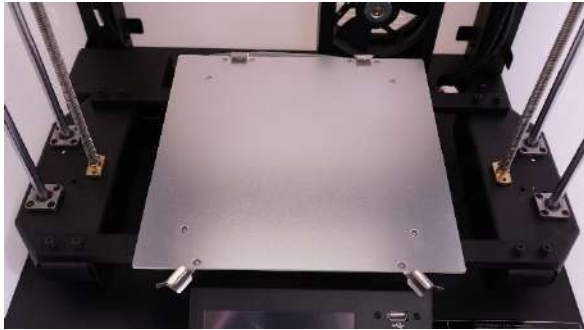


② After untightening fixing bolts (in two locations) on the extruder cable cover by using the 2mm hex-key wrench supplied as an accessory, insert the cable and fix it with the fixing bolts (in two locations).



⑤ Assemble the glass bed

① Pull the front clips so they rotate away from the heating bed like the image below.



② Slide the glass bed into the back clips and align to the heating bed. Push the front clips to snugly secure the beds.

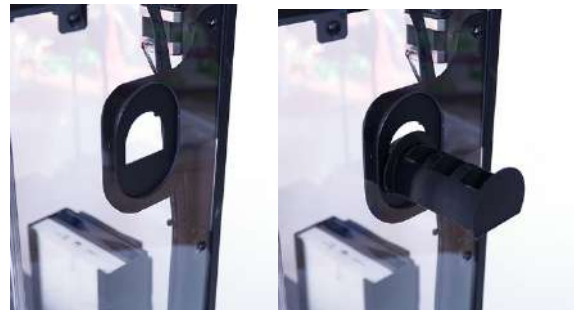


⑥ Mount the filament spool

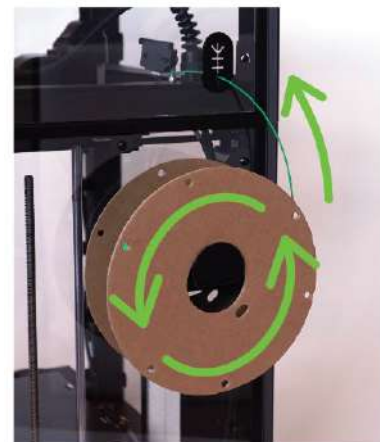
① Remove the filament spool from the packaging and snip the bent filament on an angle.






② Insert the spool holder into the mounting hole on the right side of the printer.



Mount the spool with the end of the filament heading up and when pulled on, the spool will rotate counter-clockwise.



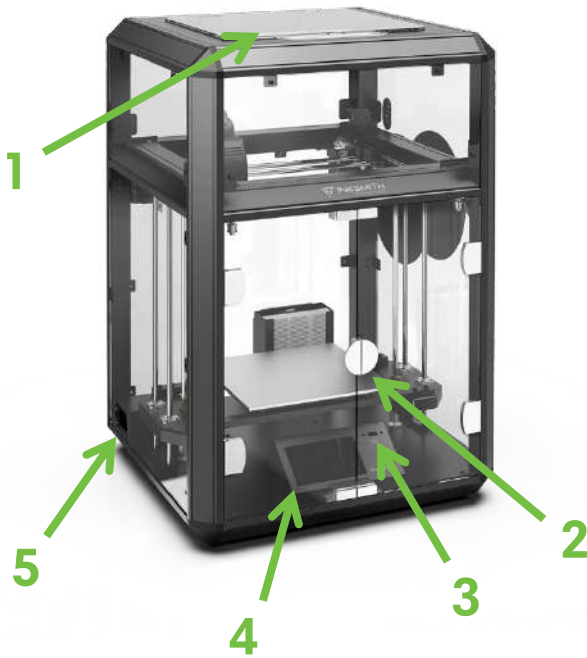
	<ul style="list-style-type: none"> • The filament spool is designed to rotate counterclockwise. If placed incorrectly on the machine, the filament may not feed correctly and could cause print failures or issues. • If others are using the printer, be sure to check the filament to confirm it is still loaded correctly. • If there are any objects around the spool or on the machine that could stop the spool's rotation, it can cause failures with both the print and the 3D printer. • Clean or remove any residue on the spool holder so the filament spool may spin freely.
	<ul style="list-style-type: none"> • If the filament is transparent, translucent, or flexible, an error may occur while trying to detect the filament in the filament sensor. When using this kind of filament, best practice is to turn off the Filament Detection function in software. • If the tip of the filament is bent, folded, or thicker than the rest, loading the filament may be difficult and there may be a ticking sound due to the filament jamming in the feeder or extruder. To solve this, trim the tip of the filament on an angle. • Don't unravel the filament or let the filament unwind from the filament spool as it may twist or break. • Properly store your filament when not in use. <ul style="list-style-type: none"> ○ If the filament is left out to the external environment for a long time, the print quality may suffer or prints may not adhere to the bed. In more severe cases, the filament may fail to extrude.
	<p>If the printer is used without removing shipping cable ties, the fixing tape, or other packaging, the machine may run into issues and/or break.</p>

Parts of the Printer



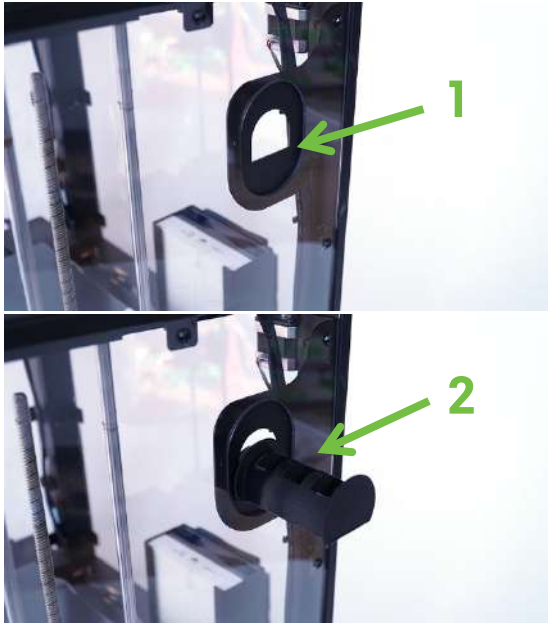
All printers get packed after a total inspection regarding the printing status. Therefore, the heating bed or the nozzle may have a trace of use when received.

Front Exterior



[1] Top Lid	Lid hinges at the back to allow access to the top of the printer.
[2] Front Doors	Main access point for prints, controls, filter replacement, and prevention of hand injury while device is operational.
[3] USB Port	Printing can be done by inserting a USB memory stick.
[4] Display	130mm display for controlling the printer
[5] Power Switch and Power Plug Port	Main power switch for the printer. Standard C13/14 plug for power.

Right Exterior



[1] Spool Holder Mounting Hole

A hole for mounting the included spool holder.

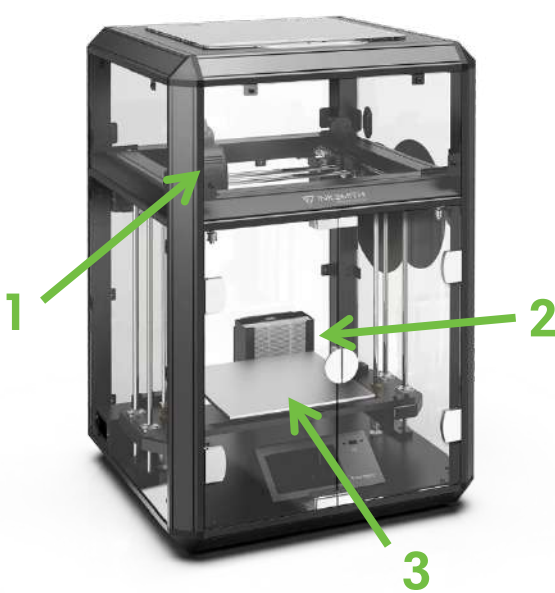
[2] Spool Holder

A spool holder mounted into the hole.



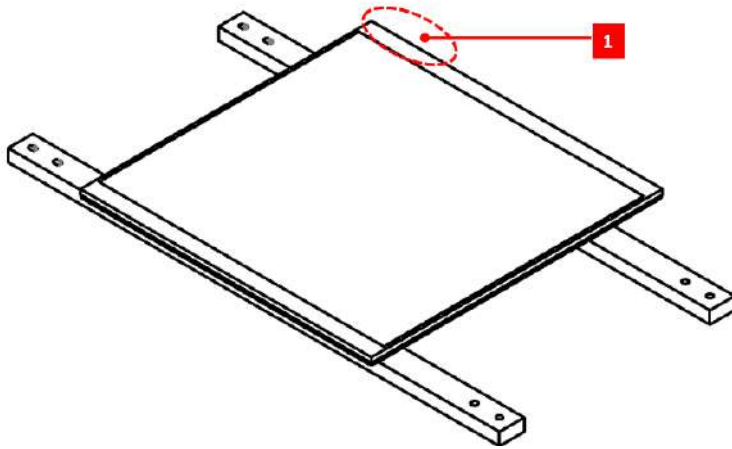
Do not plug in the power cord with a wet hand. There is a risk of electric shock.

Front Inside

	<p>[1] Extruder</p>	<p>The extruder moves across the x and y planes and pushes the filament through to melt it with the nozzle.</p>
	<p>[2] Filter Holder and Ventilation Fan</p>	<p>The clean filter slides into place in front of the fan to capture some of the fumes generated by the melted filament.</p>
	<p>[3] Heating Bed</p>	<p>Where the glass printing bed is to be placed. The heating bed generates heat to the set temperature and transfers that heat to the glass printing bed. Do not print directly on the metal heating bed.</p>

 **Since the nozzle and heating bed get heated to high temperatures during printing, do not touch them for there is a risk of burns or printing errors.**

Heating Bed



[1] Heating Bed Power Supply

The cable that supplies power to the heating element of the bed.

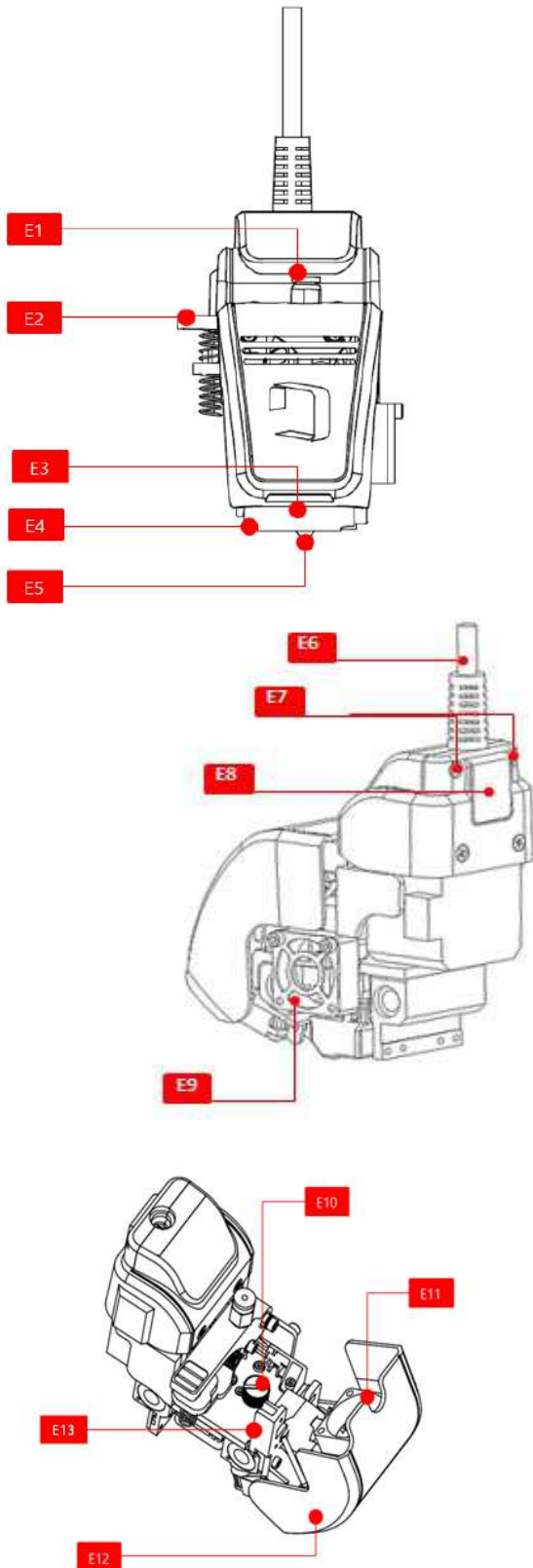


Since the temperature of the heating bed is extremely high during and after printing, be careful about the risk of burns when making contact with the bed.





Since high current power is applied to the heating bed, be cautious about an electric shock when touching the bed (especially when touching the power supply module of the bed).

Extruder

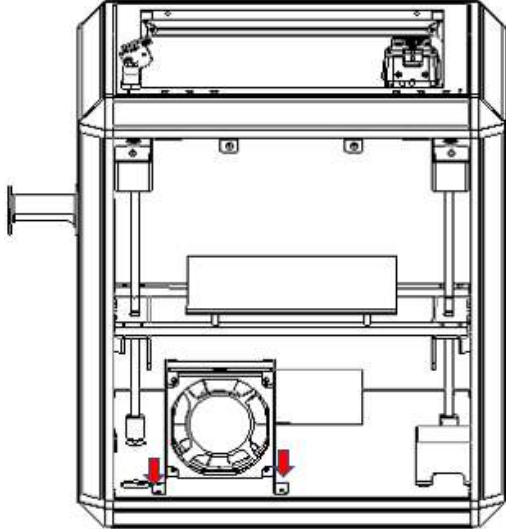



[E1] Filament Inlet	Inlet used to insert filament into the extruder.
[E2] Filament Push Handle	A handle that can be pushed when filament is being (un)loaded.
[E3] Cooling Fan	A fan that blows air towards the print.
[E4] Heating Block Cover	A cover that surrounds the heating block and nozzle (heat-resistant rubber)
[E5] Nozzle	The nozzle is where the filament gets heated, melts and then pushed out.
[E6] Extruder Cable	The power and information cable that controls the extruder's functions.
[E7] Cable Fixing bolts	Bolts for securing a cable to the extruder (M2.5)
[E8] Cable Fixing Block	A block that secures the extruder cable to the extruder so it stays attached
[E9] Cool End Fan	A fan that cools down the heating block
[E10] Extruder Module Bolt	The bolt that attaches the extruder to the gantry. Needs to be removed to replace or service the extruder externally.
[E11] Gear Fan	A fan that cools down gears inside the extruder
[E12] Extruder Cover	A cover for checking inside the extruder
[E13] X SENSOR	A sensor that detects the extruder movement to left or right

 **Using any other extruder than the Makerforge Extruder is not covered under warranty and could cause issues.**


 **The temperature of the extruder raises as well as the nozzle during printing, be careful not to touch. When opening the extruder cover, check for blockages in the filament tube. Service the extruder module only after the power is turned off and the temperature of the nozzle is sufficiently cooled down.**


Replacing the Filter Fan (Optional)

<p>Unscrew the fan and filter mount from the base of the printer.</p> 	<p>Unplug the Fan Cable.</p> 
<p>Remove the Fan housing from the Makerforge, replace the fan, install the fan housing back in. Remember to reconnect the fan cable.</p>	

Replacement of the Clean Filter (Optional)

<p>Lift the dirty filter out of the slot. Remove the vinyl packaging from the new clean filter and slide the new filter into the slot on the fan with the arrow facing out.</p>	
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Make sure to mount the Clean Filter facing the correct direction. (The arrow must point to the outside.)
If it is mounted in the wrong direction, the filtering performance will be decreased. Remember to give the fan and surrounding area a gentle dusting to prevent excess filament or other objects from lodging in the fan and potentially breaking it.
- 

When replacing the Clean Filter, make sure the machine is off.

3. User Interface

This chapter will cover the overview of the user interface (UI).

Overview

The Makerforge is equipped with a 5 Inch (125mm) touch screen. The screen is comprised of 4 sections:

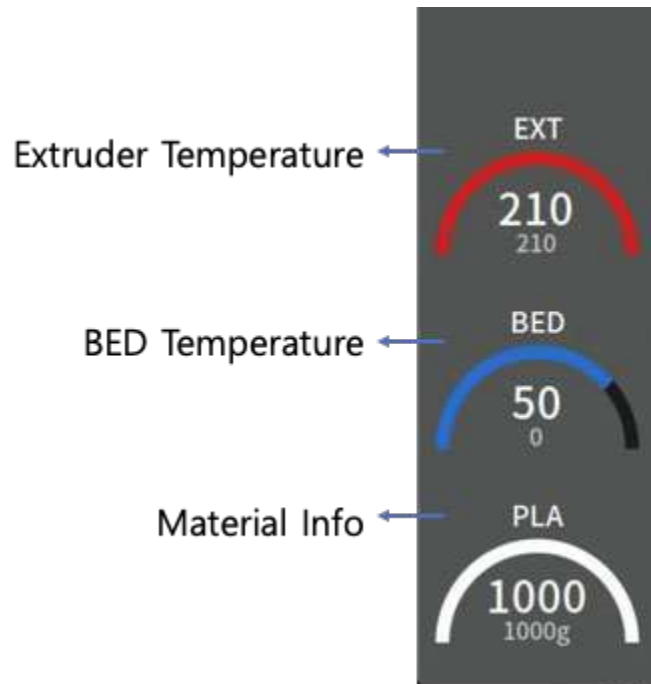
Temperature Readouts, Quick Info, Main Screen, and Toolbar.



The touch screen is just inside the doors, in front of the printing bed. With the touchscreen, tasks such as the following can be completed:

- Monitor 3D printer status and print status
- Load & unload filament
- Preheat the bed and nozzle
- Display of the remaining amount of a filament, extruder temperature, and bed temperature
- View the sliced file info and the execution of printing/copying functions
- Individually move parts of the printer (extruder position, filament loader, etc)
- Start device self-inspection routine
- Change various device configuration values and the initialization function
- Set LAN and Wi-Fi access
- Set language
- Update firmware
- View print history
- View device info
- View and copy system logs






Temperature Readouts



- **Extruder Temperature info:** Current temperature (*top number*) and configured temperature (*bottom number*) information of the extruder.
- **Bed Temperature info:** Current temperature (*top number*) and configured temperature (*bottom number*) information of the bed.
- **Material Info:** Displays the current set type of material and the remaining amount/maximum capacity.

Quick Info



-  Network Connection Status
-  External Memory Connection Status
-  Cubicreator Connection Status
-  Device Error Status Warning
-  Filament Status

From left to right:

- **Heating:** This icon indicates if the bed or nozzle are heated to the set temperature.
- **Filament Status:** Shows if filament is being detected by the sensor.
- **Device Error Status Warning Display:** The icon will go red if a problem occurs in the device, and a detailed status report can be checked through the Inspection menu.
- **Connection Status:** It shows the connection status to the CuraForCubicon program. This device supports a wireless connection to the slicing software.
- **External Memory Connection Status:** Shows the connection status to the external memory port (i.e., a USB memory stick).
- **Network Connection Status:** Shows the connection status to the network such as Wi-Fi.

Main Screen Area

Info on the screen display area in the touch screen displays different contents according to the icon that has been selected in the function display area.

Basically, when the power is on, the printer status is displayed as the default screen.

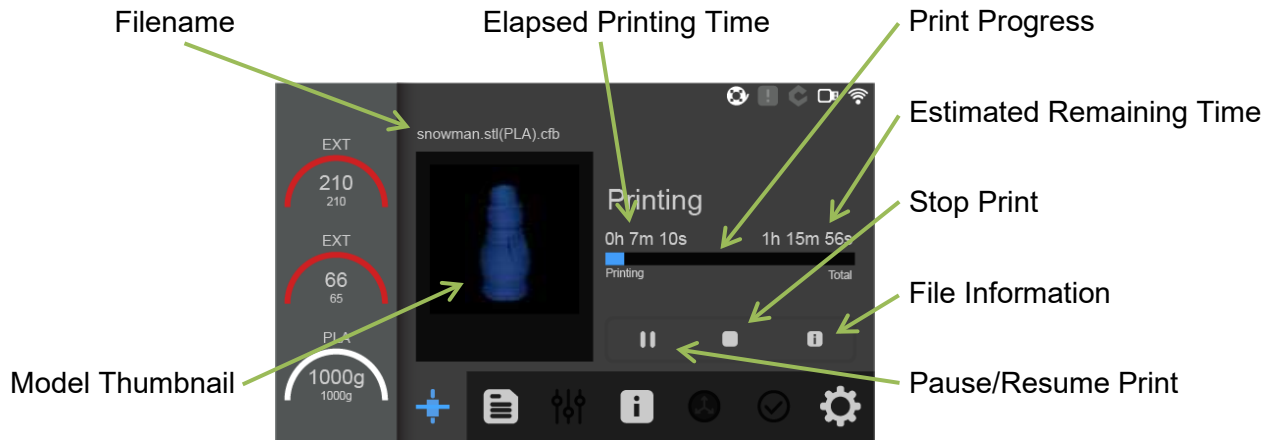
Toolbar

The navigation toolbar allows for access to the other screens to adjust settings and get updates on the printer and print. By touching each icon, the **Main Screen** will change to the corresponding menu. The farthest left icon, **Print**, is disabled until the machine is actively printing. The icons are (from left to right): **Print, File, Temperature Control, Info, Inspection, Motion, Settings**



Printing Screen

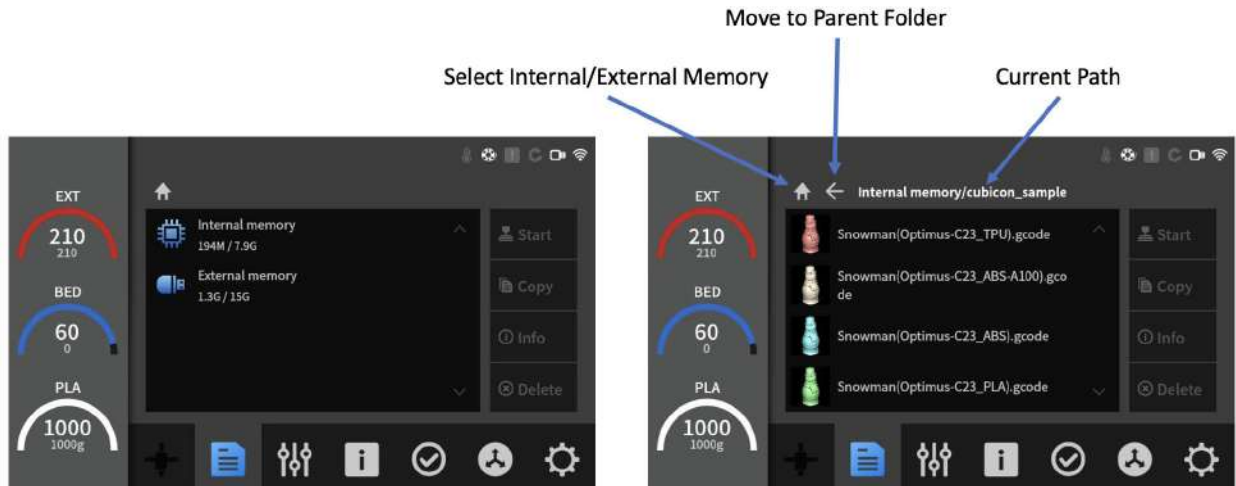
Printing screen allows for monitoring the print status in real-time when the machine is printing.



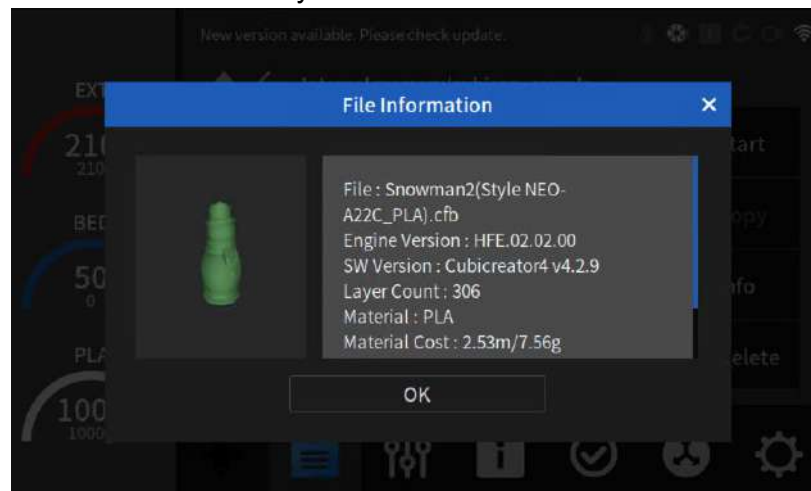
- **File Name:** It only supports files created in CuraForCubicon or Launchpad3D,, and have .gcode extensions.
- **Thumbnail:** Depending on how the file is made, a thumbnail of the model can be displayed here.
- **Elapsed Printing Time:** The length of time the print has currently been running.
- **Print Progress:** Printing progress displayed as a progress bar.
- **Estimated Remaining Time:** The time estimated to be remaining for the current print. Estimated Remaining time may be different from the actual printing time depending on the shape of the model and the slicing options chosen.
- **Pause/Resume:** Pause or resume the current print. When paused, the print can continue from the point it stopped by pressing Resume.
- **Stop:** Current print is completely stopped. It can't be resumed, and it must be restarted from the start.
- **File Info:** Info about the current print can be viewed.

File

The File screen can perform Copy/Delete/Print functions from an internal or external memory.



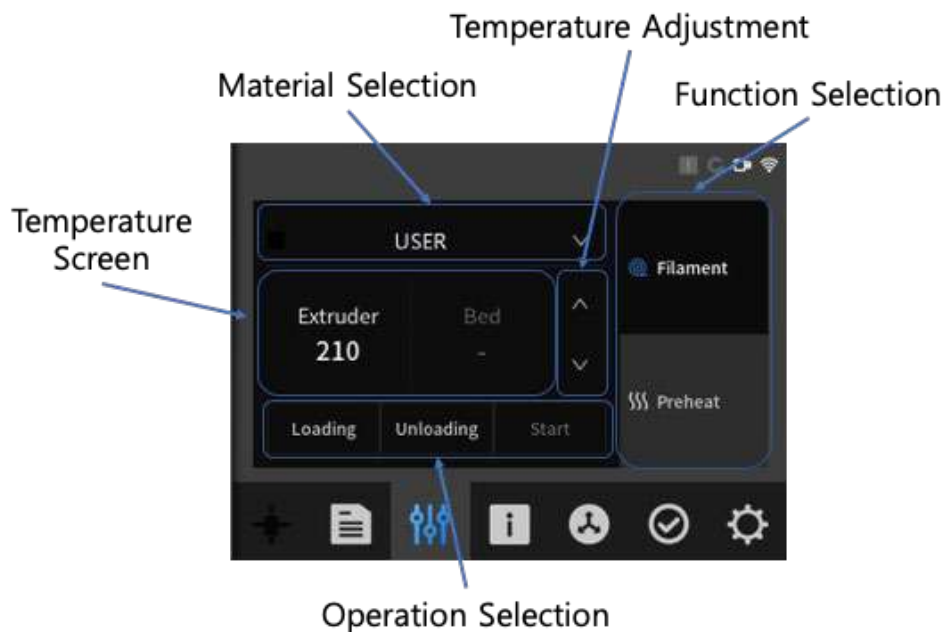
- **Internal Memory:** A list of the files stored on the internal memory (Maximum 8 GB is supported).
- **External Memory:** It gets activated when a USB memory stick is inserted, from there, a list of the files from the external memory can be viewed.
- **Move to the Parent Folder:** Touch this button to move to the parent folder in the file list.
- **Current Folder Path:** The name of the folder(s) that is currently being explored.
- **Copy:** The file that has been selected can be copied between internal memory and external memory.
- **Delete:** It deletes the file that has been selected from the current memory.
- **Start:** It prints the file that has been selected.
- **Info:** It shows the brief summary info of a slice file.



Temperature Control

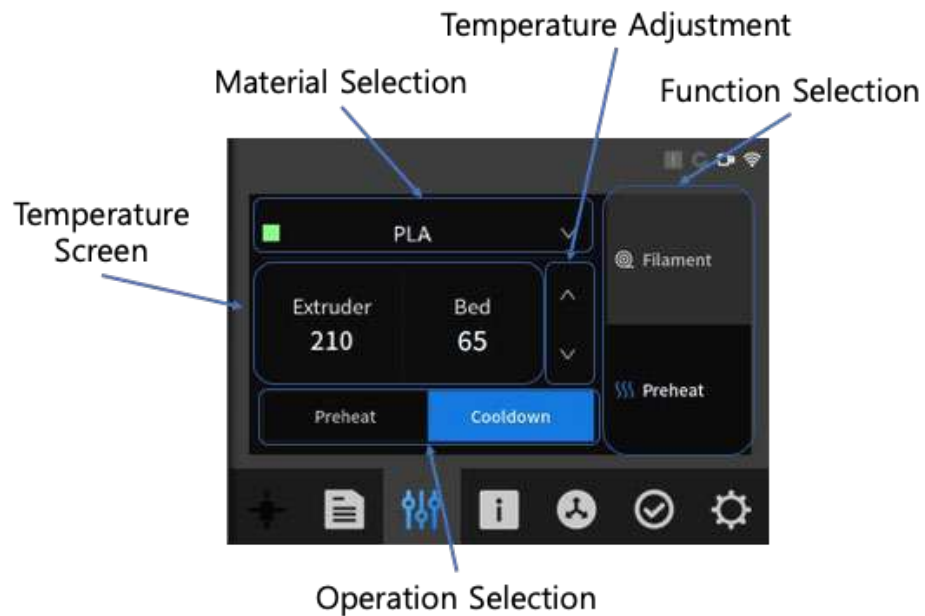
The **Temperature Control** screen allows for Filament Loading/Unloading and Preheat operations. Each internal function can get configured here so that the extruder and bed temperature are able to be set according to the material.

Control (Filament)



- **Function Selection:** Select **Filament** to load or unload filament from the extruder or **Preheat** to set the preheat temperatures and/or start the preheating process of the bed and extruder.
- **Extruder Material:** To select the type of filament that's currently loaded and going to be used for the next print.
- **Temperature Screen:** Readouts of the current temperature & configured temperature for the selected material.
- **Temperature Adjustment:** Increase or decrease the temperatures of the selected item manually with these arrows.
- **Operation Selection:** After selecting an operation to perform such as loading/unloading, the operation can be started by pressing the Start button (which gets activated after the preheating is completed) once the object reaches a sufficient temperature.

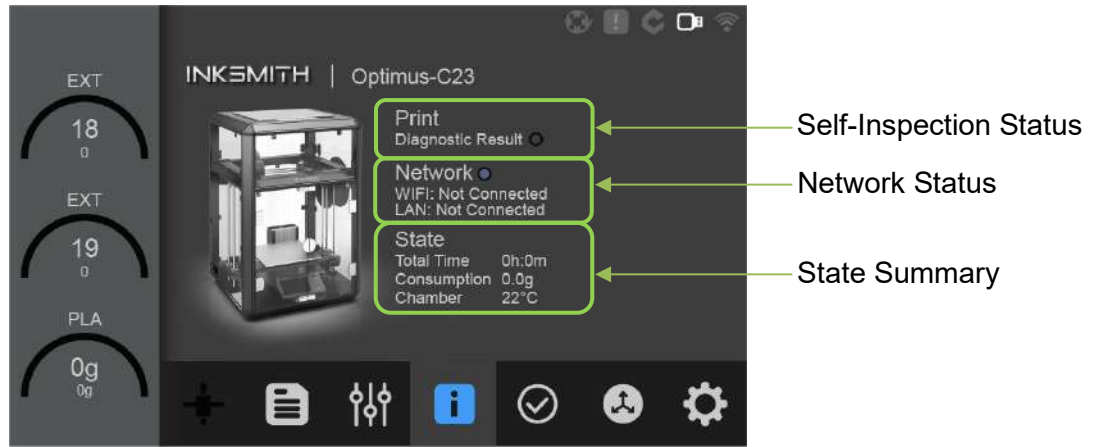
Control (Preheat)



- **Preheat:** Start the preheating operation to heat the elements to the set temperature.
- **Cooldown:** All heating operations get stopped, and the device gets cooled down by turning on the cooling fan.

State

Shows the current status of the printer.



- **Self-inspection Status:** Printer self-inspection result can be checked.
- **Network Status:** IP address of currently connected network is displayed.
- **State Summary:** Summary info regarding the filament that is currently set and other printer statuses.

Motion

The **Motion** screen enables the user to directly adjust the parts that move for the purpose of maintenance or testing.

Motion (Extruder)

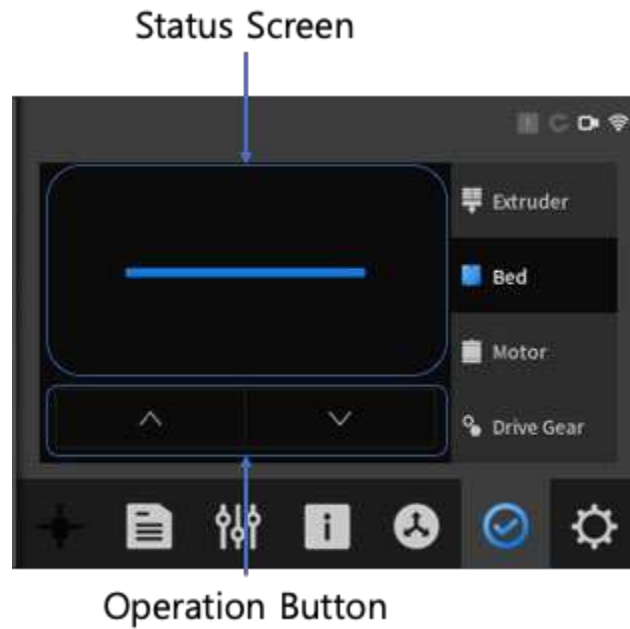
From this screen, the user can check the Home operation (moves the extruder to its starting position) and the Parking operation of the extruder.



- **Park Button:** It moves the extruder to the parking position.
- **Home Button:** It moves the extruder to the home position.
- **Status Screen:** Illustrates the position of the extruder.

Motion (Bed)

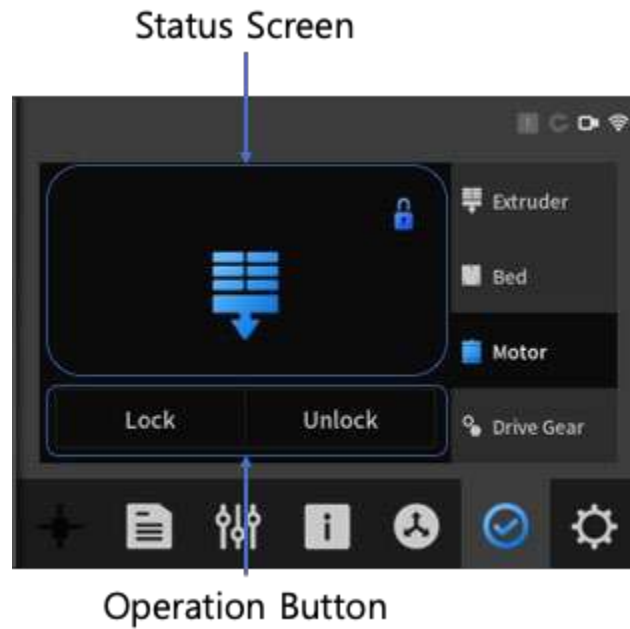
From this screen, the user can test the Up & Down motions of the bed.



- **Up Button:** Performs the operation of moving the bed up.
- **Down Button:** Performs the operation of moving the bed down.
- **Status Screen:** Illustrates the position of the bed.

Motion (Motor)

This screen allows the user to lock and unlock the bed and extruder's motor.



- **Lock Button:** It sets motors of X, Y and Z axes to a lock state.
- **Unlock Button:** It sets motors of X, Y and Z axes to an unlock state, and allows the extruder and the bed to move manually.

Motion (Drive Gear)

This screen allows the user to advance and retract the filament drive gear on the extruder.



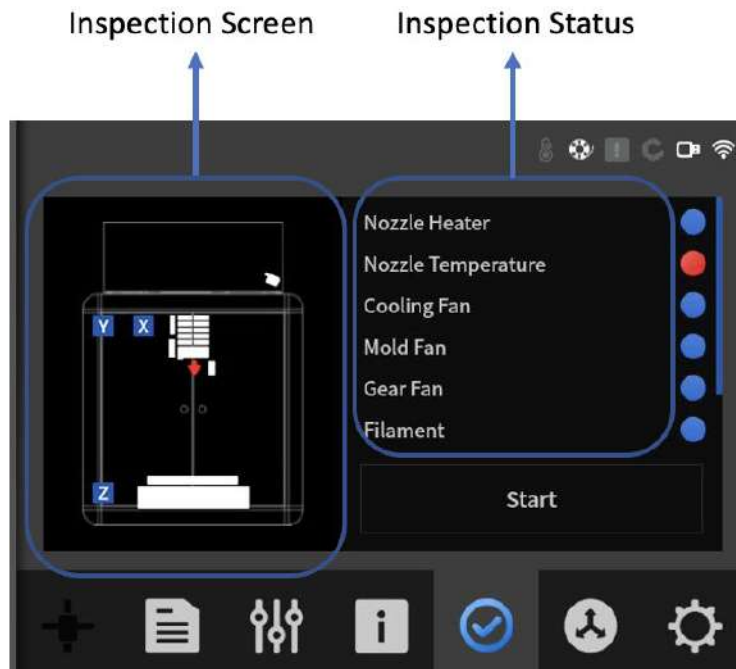
- **Status Screen:** Displays the nozzle temperature and the length that has been discharged.
- **Operation Button:** The buttons to advance or retract the gears at the nozzle.



Since cracking or clogging may occur if the temperature of the nozzle doesn't match that of the inserted filament and the nozzle is not sufficiently heated, be cautious.

Self-test

Self-test shows the abnormalities to a user through various sensors. The self-test starts when the **Start** button is pressed.



- **Inspection Screen:** The device inspection status and what it's currently testing. If there is abnormality, the abnormal part would be displayed in red as shown in the picture.
- **Inspection Status:** The detail of the inspection screen on the left is displayed in detail with the names of the related part. Ones without a problem from the inspection are marked 'PASS' in blue color, and ones with a problem from the inspection are marked 'FAIL' in red color.



Self-test doesn't inspect entire functions or status of the device.

Settings

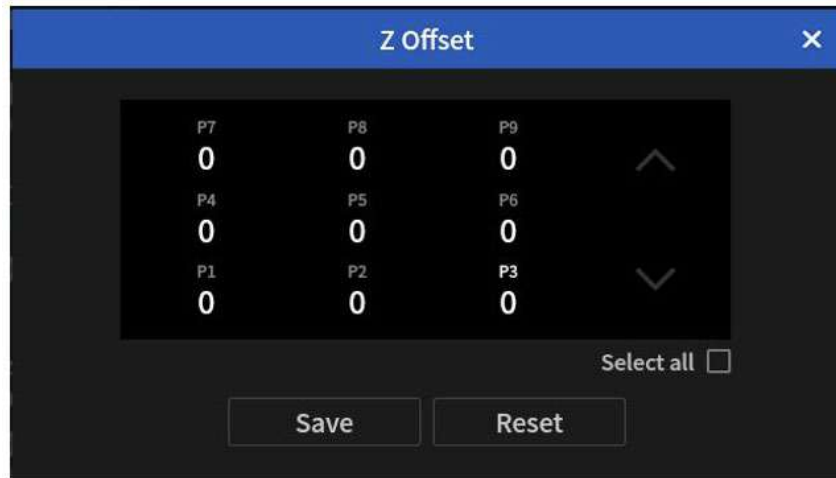
Check and configure various setting values of the device and configure the functions such as communication network settings and language settings.

The device upgrade support and the printing history info can be checked.

Settings (Function)



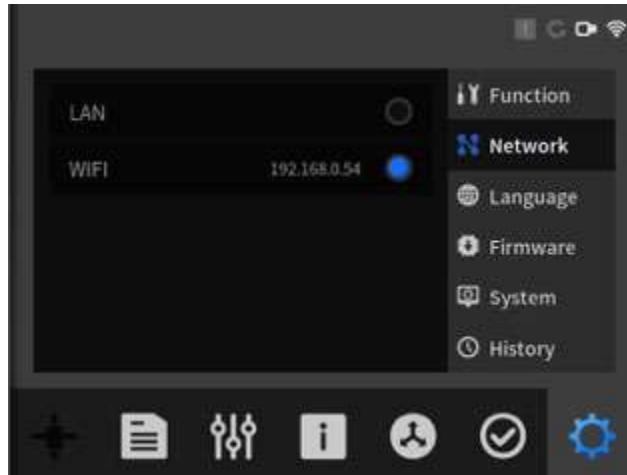
- **Auto Leveling:** Auto leveling ON will level the bed before each print. Auto Leveling OFF will only level the bed once, when the printer is turned on.
- **Filament Check:** Detects whether or not there is filament in the sensor. After it is configured to be ON, a user can't proceed with printing if the filament does not go through the sensor, or it is not detected. If the filament is used up, the print will get suspended automatically in the Pause state. (If your filament is flexible or clear, an error may occur during the detection process. In such a case, set the Filament Check function to OFF.)
- **Filter Fan:** Turns the filter fan ON or OFF while the print is running.
- **Visible Menu Label:** Turn displaying the menu labels ON or OFF.
- **File Sorting:** Choose how files are sorted (e.g., by newest, by name).
- **Sound:** Adjust the sound volume of the printer.
- **Z Offset:** It can adjust the 9 point Z-axis offset values of the bed. (Continued on next page)



<Z Offset Setup Screen>

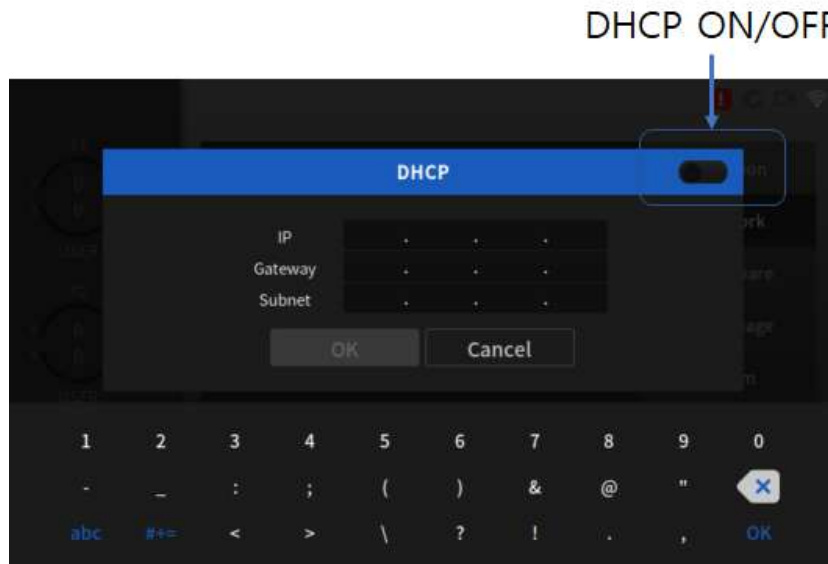
Z Offset: Z offset values for the front of the bed (P1~P3), the middle of the bed (P4~P6), and the rear of the bed (P7~P9) can be each designated. The unit is *um*, and the range is between -150um and 1000um. If the filament doesn't adhere to the bed because the bed and the nozzle are too far apart during printing, it needs to be set to negative (-) value, and if the filament doesn't get extruded, the bed and the nozzle are too close during printing, set the value to positive (+). After setting the desired value, press the Save button to apply.

Settings (Network)



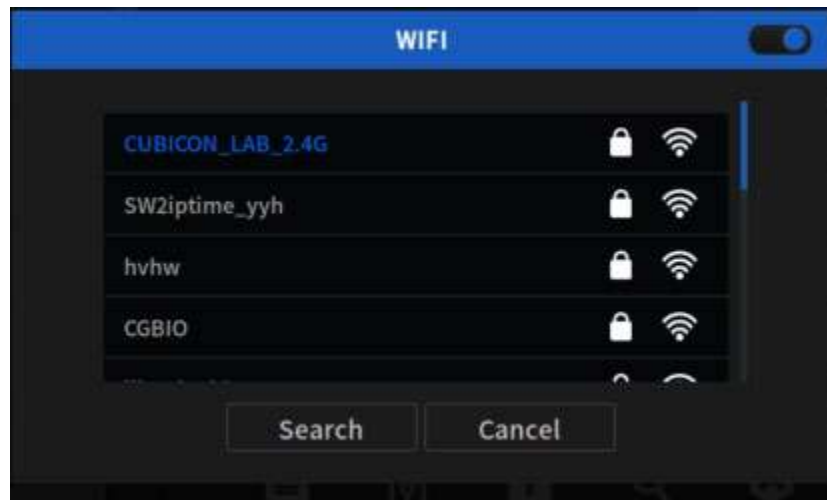
LAN: Wired LAN can be configured. If DHCP is activated and the network (router) environment supports DHCP, the IP would be automatically allocated and configured. If the network environment such as your company doesn't support DHCP, the DHCP configuration needs to be cleared, and the network needs to be configured manually.

(The Makerforge does not support wired network connection.)

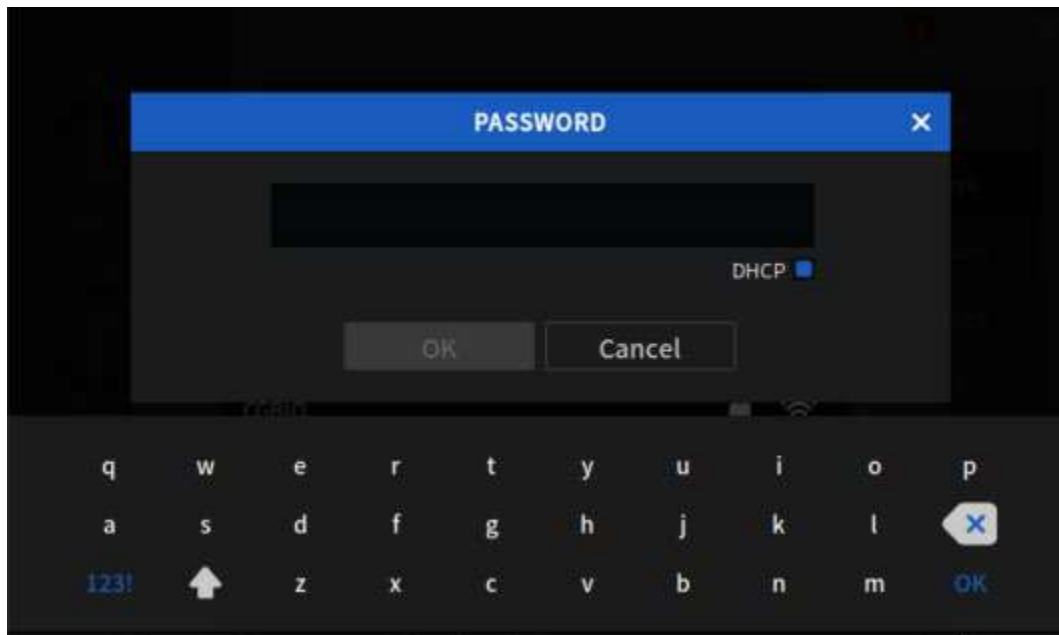


<LAN Setup Screen>

- **WIFI:** The network can be configured through wireless LAN environment.

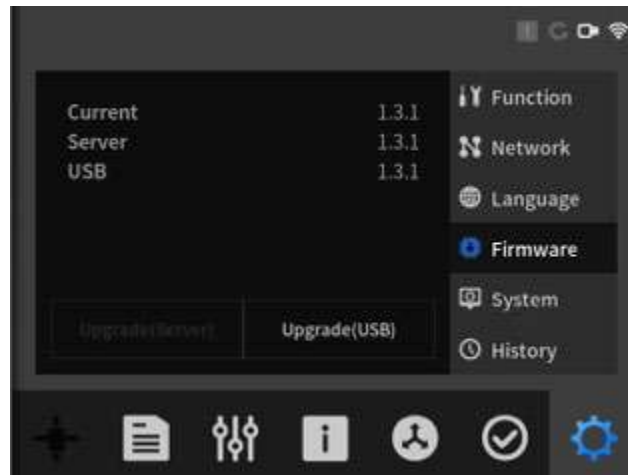


<WIFI Search Screen>



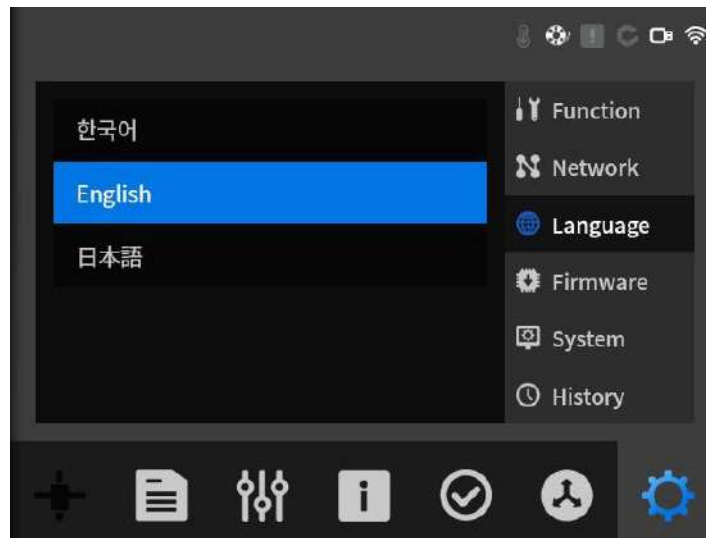
<WIFI Password Input Screen>

Settings (Firmware)



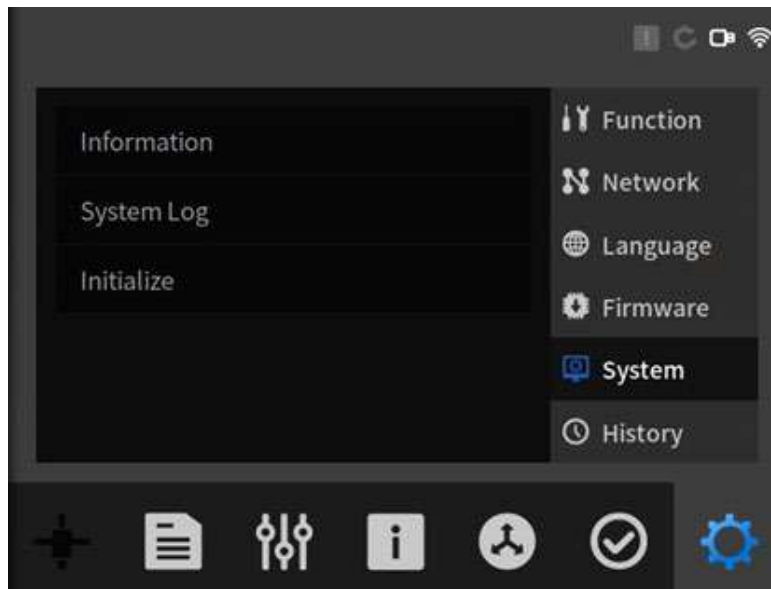
- **Current:** The current firmware version.
- **Server:** The version that is registered in the update server.
- **Upgrade(Server):** Button to upgrade wirelessly from a server.
- **Upgrade(USB):** Button to upgrade through the currently inserted USB memory stick.

Settings (Language)

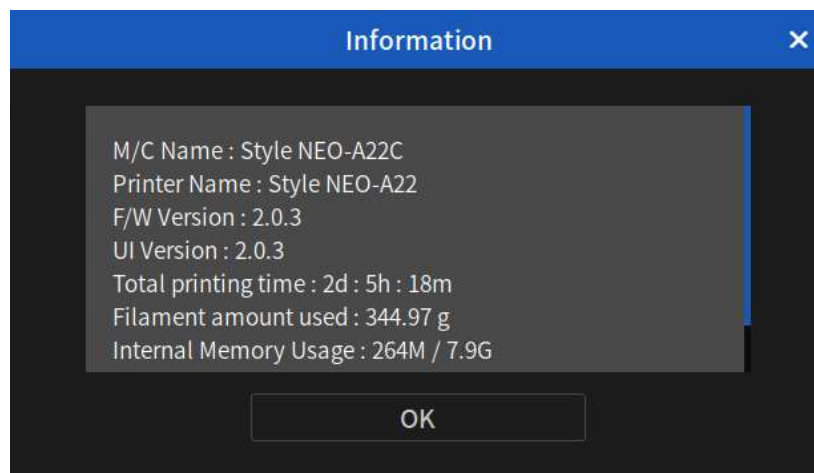


Change the language between Korean, English and Japanese.

Settings (System)



Information: The printer's current information and status. Software version info, firmware (F/W) version info, and total printing time can be checked.

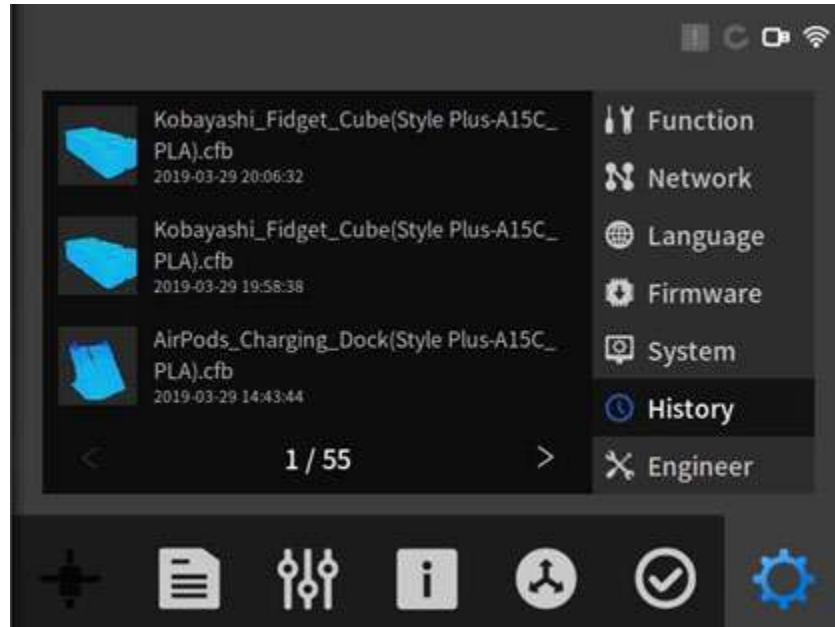


<System Information>

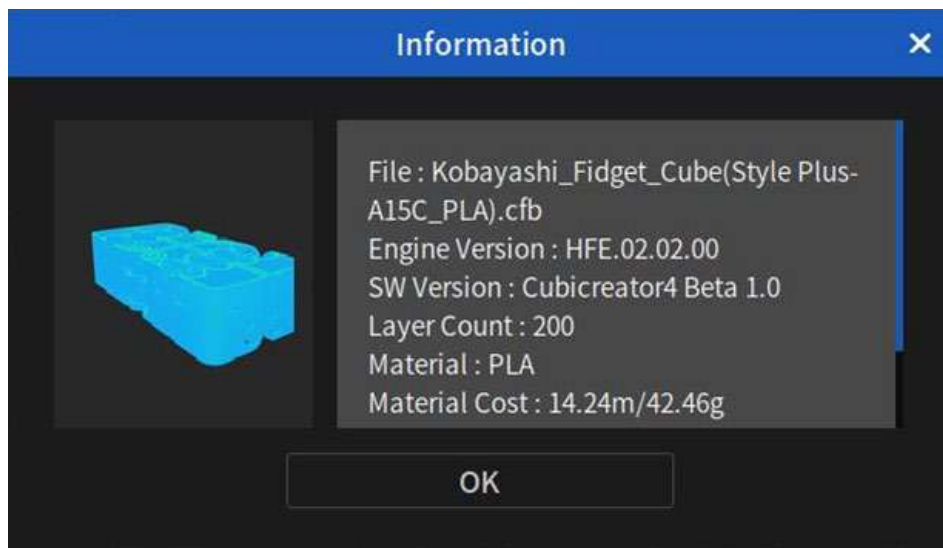
- **System Log:** The logs that have been created during the operation can be checked. The logs can be saved when a USB memory stick is connected.
- **Initialize:** It resets all settings and setting values to the factory settings.

Settings (History)

Shows the history info of the files that have been printed by the device.



Clicking on a file will bring up a detailed summary.

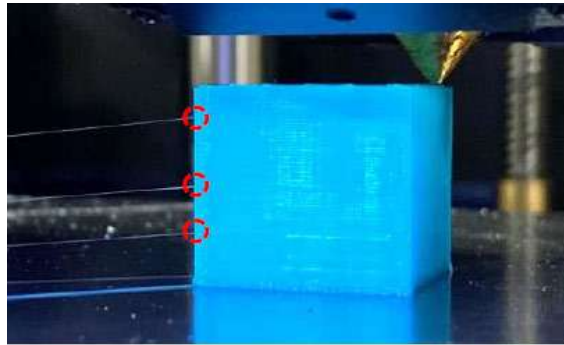


<Detailed History Info>

Power Failure Compensation Function

Power failure compensation function allows the print to resume printing within a certain time period (within 5 minutes) when the power supply to the 3D printer is interrupted due to a power outage or unplugged by mistake.

If the power returns after 5 minutes, the bed increases temperature back to what it was before the power outage and waits for the user to resume the print. If the user resumes the print, the printer resumes the printing from the stopped point.



- In case that the machine's power switch is turned off or the power is disconnected for more than approximately 5 minutes, the power failure compensation function will not be executed.
- Since the layer that is being printed is lost during the outage, it will have an effect on the quality.
- Deformation may occur if the print is removed from the bed or gets dislodged during the power outage or the standby period while the printer heats back up, the print may become damaged if the print is resumed.

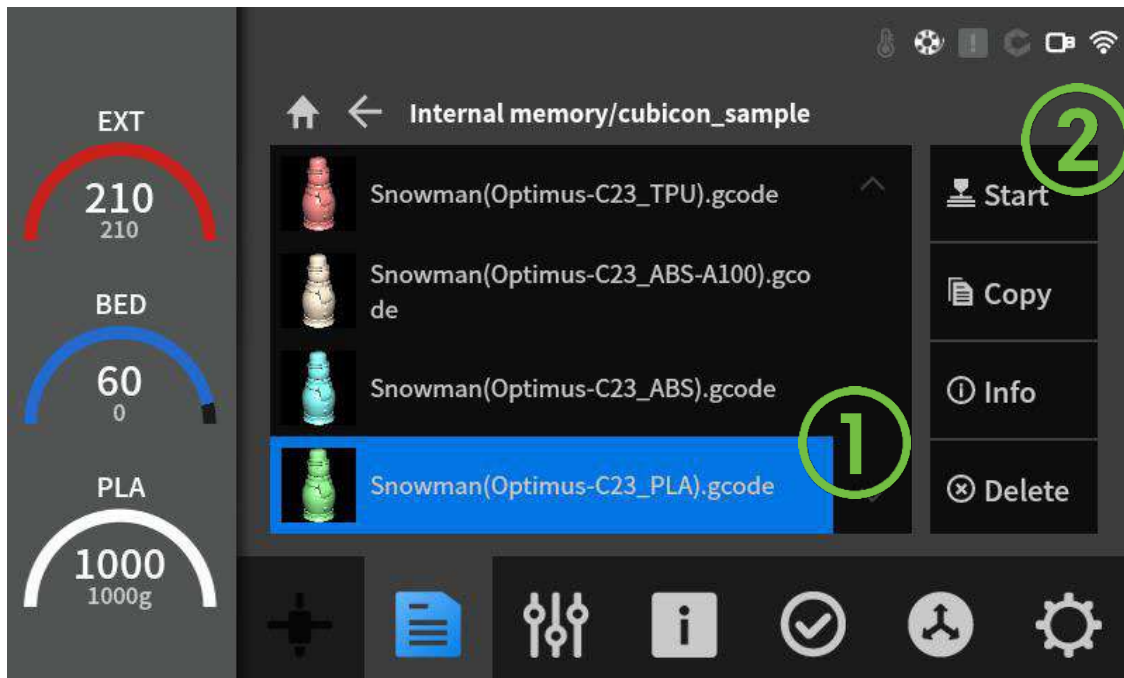
4. Printing

If you have successfully setup your Makerforge according to [Chapter 2. Components and Installation](#) earlier, let's print a sample that is stored in the internal memory in order to test whether the device operates normally.

After selecting Internal Memory under File, go to the sample folder. Among files, select the **Snowman(Optimus-C23_PLA).gcode** file (1).

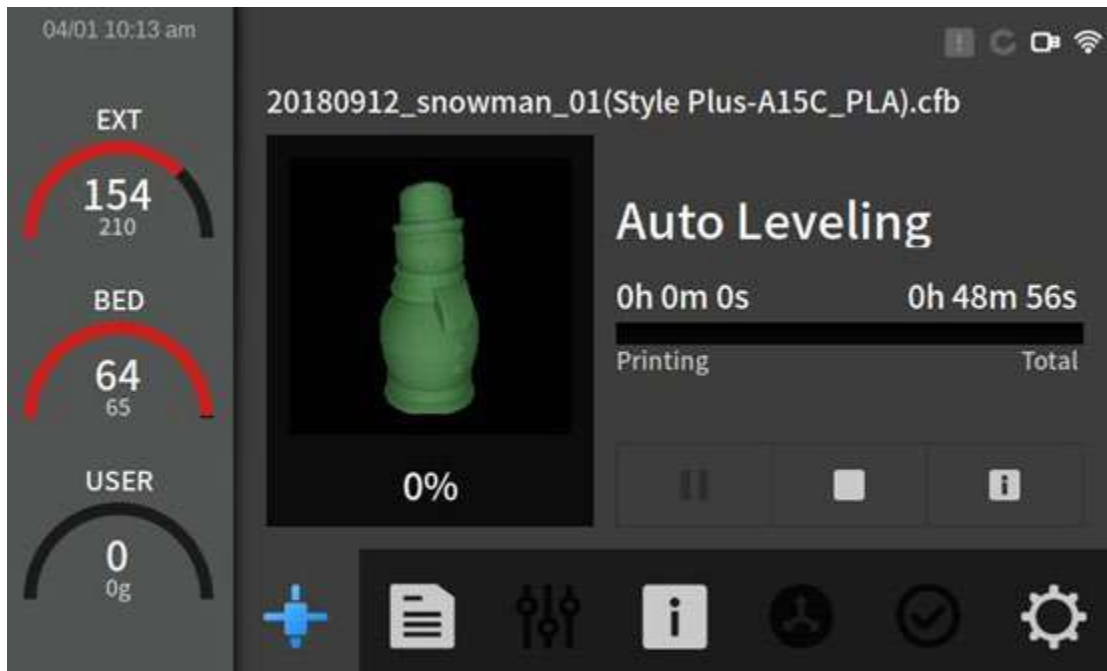


Since this manual assumes the use of PLA filament as a default, PLA material filament must be mounted on the spool. If some other materials are used, a printing file that is appropriate for the material must be selected.



If all the setup is completed, start printing by pressing the **Start** button (2).

Once processing the printing file is complete, the following Print screen will appear, and the printing progress status can be monitored in real-time.



Printing would be proceeded in the following order.



Filament Detection → Heating → Z-axis Auto Leveling → Printing

- Filament Detection:** Before starting to print, the printer will check if there is filament running through the filament sensor. If the filament is not inserted in the detection sensor, an error message will be displayed in the screen, and the printing process will be stopped.
 (If Settings → Function → Filament Check is set to OFF, the filament existence detection process will be skipped.)
- Heating:** The nozzle and bed will heat to temperatures set in the file's gcode. Heating is performed on the extruder and the bed simultaneously.
- Z-axis Auto Leveling:** It makes precise printing possible by measuring the height of 9 points of the Bed. Does not happen if Auto Leveling is turned OFF, in which case, it's only preformed upon the printer's startup.
 The leveling is to be performed after preheating the extruder to a temperature that is 50 degrees lower than the set printing reference temperature in order to minimize filament flowing through the nozzle. If the printing is done after preheating to the printing temperature, the standby time may become longer due to the leveling execution temperature setting.
- Printing:** Then it starts printing the object and does so using an enhanced PGM (Plane Geometry Mapping) algorithm.

5. Maintenance

A 3D printer contains a lot of moving parts and parts that are considered consumable. Consumable parts are parts that naturally wear down with use, like a glass printing bed. Just as maintenance is very important in industrial equipment, a 3D printer also has certain areas that require maintenance and management by a user.

Maintenance of the Extruder

	<ul style="list-style-type: none"> * Do not perform maintenance on the extruder while the machine is powered or ON. There is a chance for electric shock while the power is on, which may damage the user and the printer. Assembly/disassembly of the extruder module must be performed after the temperature of the nozzle is lowered to the room temperature while the power is turned off. * In case there is a need to disassemble it while it is hot, be cautious to avoid possible burns since entire extruder is hot and wear gloves during the task.
	<ul style="list-style-type: none"> * Be cautious since the sensor or other parts may be damaged if the extruder module is disassembled while the filament is still loaded into the extruder. * In case unloading fails due to the breakdown or other causes, cut off the filament from the filament inlet, and then separate the extruder module.

The extruder module can be disassembled from the main body of the printer just by untightening a few bolts and pulling out the extruder cable (outlined below).

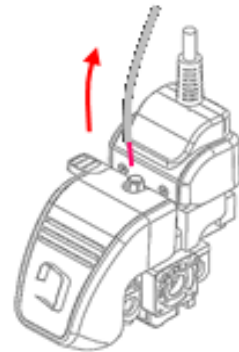
If a problem occurs in the extruder module, a user can disassemble just the extruder module from the main body of the printer and request a warranty service, and therefore, the user can doesn't need to send the entire printer if just the extruder needs servicing.

If it is difficult to disassemble the extruder module, request the warranty service and sending the entire body of the printer rather than attempting to disassemble it forcibly.

The assembly sequence is in the reverse order of the disassembly sequence.

Disassembly of the Extruder Module

① In order to disassemble the extruder, **remove the filament in the extruder by completing the unloading sequence.**

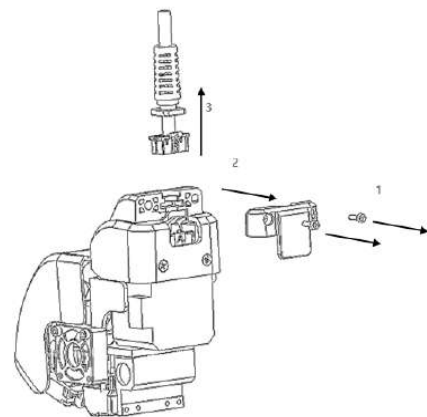


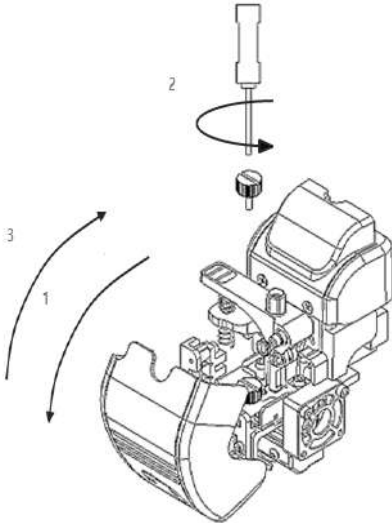
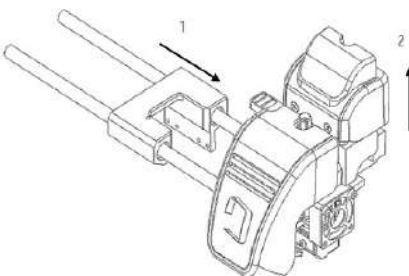
If the extruder module gets disassembled while the filament is inserted inside the extruder, it may not dislodge as the filament can harden inside the nozzle.
If the unloading (removing filament from the extruder) can't be executed due to the breakdown or other causes, cut off the filament above the filament inlet and then disassemble the extruder module.



② **Turn [OFF](O) the power of the main body of the printer.** If you disassemble the extruder module while the power is [ON], you or the printer may get damaged.



③ After untightening the cable fixing bolts (2 places) using the 2mm hex key wrench (supplied),
(2) remove the extruder cable fixing block,
(3) pull out the extruder cable from the extruder module carefully by pressing the locking unit.
Do not pull forcefully.



<p>④ Hinge open the extruder cover (1), unscrew the extruder module fixing bolt (2), and then close the extruder cover (3).</p> <p>Since the cable fixing bolts, the extruder module fixing bolt, and the cable fixing block must be used when reassembling the module, be sure to store them securely so that they don't get lost.</p>	
<p>⑤ Pull the extruder to the right (1) while holding the base that's connected to the rails. When the module is clear of the base, lift up to remove. Be careful not to damage the extruder any further or the bar and belt in the main body of the printer during the disassembly.</p>	

	<p>Clean extruder regularly to minimize number of blockages.</p>
	<ul style="list-style-type: none"> • If the extruder cover needs to be opened when there's a print on the bed, be careful not to hit the print with the extruder cover as this may damage or mess up your current print. When opening the cover, check whether there is any obstacle under the extruder. • Be cautious not to damage the wires inside the extruder. If the wires get damaged, the extruder won't work or might work in an unintended way causing more issues and damages. • Assembly/disassembly of the extruder module must be performed only when the power of the printer is turned off, and the temperature of the nozzle has been completely cooled down. • If the assembly/disassembly must be performed while the nozzle is hot, be careful not to burn yourself. • Don't fold, jam, tear, or cut the extruder cable during the disassembly/reassembly process. • Make sure the extruder is mounted accurately back onto the machine before printing. Otherwise, prints will fail, and more damage could be done to other parts of the printer. Properly screw in the module fixing bolts and fully connect the extruder cable. • Don't operate or service with a wet hand. Risk of shock.

Extruder (Management)

The nozzle is located at the very bottom of the extruder, this is where the filament gets heated, melted, and extrudes from to create your printed object.

The nozzle is a consumable part in the printer, and it needs to be replaced after it is used for a long time due to the normal wear or due to the accumulation of carbonized residues of the filament and foreign substances inside of the nozzle. However, if it is not appropriately managed, the printing quality becomes poor as the problem occurs a lot earlier than the estimated lifecycle, and in severe case, the nozzle needs to be replaced as the hole of the nozzle gets clogged. In order to use the nozzle with stable printing quality for a long time, clean it regularly.

1. Maintaining the Nozzle in Good Condition

Once a nozzle clogs, there is a high probability that it will continue to clog until it is replaced. To prevent this, the nozzle should be cleaned regularly.



- Check and manage the condition of the nozzle regularly.
- If the thickness of the filament that is extruded from the nozzle is too thin or is not flowing at a consistent rate during printing, stop printing and proceed with the nozzle cleaning. If you let the problem continue, there might not be any chance to keep using the nozzle and it must be replaced.
- When changing or replacing filament, clean the nozzle sufficiently as much as possible. Especially **when changed to a filament with different printing temperature, cleaning the nozzle is mandatory.**
- In general, the filament contains particulates that cause buildup within the nozzle. The amount of debris is linked to the colour of filament being used, darker colours generally have more debris. Materials that are very sticky such as TPU, PETG and PVA, and materials that are a mixture of the basic filament and some other materials such as wood can easily adhere to the inner wall of the nozzle or get carbonized. If such filaments are mainly used, frequently clean the nozzle.
- When a filament hardens after being melted through the extruder, its composition can change and often becomes harder to melt. If the filament continues to be heated and cooled within the nozzle (without being extruded) the filament or particulates from the filament can clog the nozzle.
- Once the vacuumed packaging of a filament gets opened, the filament starts to capture humidity and dusts. If such contaminants accumulate a lot, it can cause clogs in the nozzle. Therefore, use it as fast as possible once it is opened, and it is very helpful to use a dust filter in order to reduce the dust on the surface of the filament.

2. Cleaning the Inside of the Nozzle using the Loading

1. Take out the filament sufficiently by using **{Control → Filament → Loading}** in the control menu. If a user doesn't stop it, the loading automatically stops after a certain amount of the filament gets discharged.

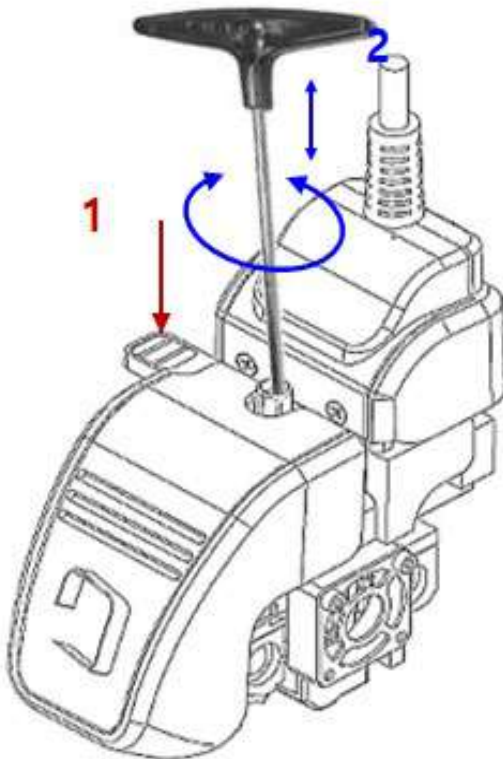
Set the temperature of the Loaded Filament to the temperature of the filament to be used.

2. If it still doesn't print well after completing step (1.), repeat the process but set the temperature slightly higher than previous.

	<p>Do not raise the temperature by more than 10% that of the filament's rated temperature. The clogging of the nozzle may get worse if the filament becomes too hot and doesn't flow.</p>
	<p>If the filament doesn't come out of the nozzle at all or it comes out very thin, do not perform '2. Cleaning the Inside of the nozzle using the Loading'. It may cause a breakdown as the filament gets cracked or it gets twisted in the extruder.</p>

3. Cleaning the Inside of the Nozzle Using the Nozzle Management Pin

If the printing quality doesn't improve through the Loading method or if the Loading method can't be executed, there is probably still residue inside the nozzle. To potentially fix this, clean the inside of the nozzle using the nozzle management pin that has been supplied as an accessory.



- a) Remove the filament inside the extruder by performing the Unloading procedure.
- b) Heat up the extruder by raising the temperature of the extruder nozzle by at most 10% above the rated temperature of the filament that is expected to be remaining in the nozzle. This should sufficiently melt the leftover filament. If the extruder nozzle is heated to the temperature that is too high, the nozzle may get clogged as the filament that is remaining in the nozzle would get carbonized, and therefore be cautious about the temperature.
- c) While pressing down the filament push button (1), insert the nozzle management pin into the nozzle (2), and clean the nozzle by pushing foreign substances in the nozzle down by moving it up and down or turning it slowly. It can be done more easily if you insert the nozzle management pin by keeping the distance between the filament inlet and the tip of the nozzle in mind.

- d) Once the removal of foreign substances in the nozzle is done to some degree, wait a while in the state where the temperature of the nozzle is raised, and repeat the cleaning of the foreign substances as in c). This is to remove the foreign substances that have been melted down by waiting until the foreign substances that had been adhered to the inner wall of the nozzle to melt down.
- e) Insert the filament to be used by following the Loading procedure repeat the processes from **2. Cleaning the inside of the nozzle by the Loading** This is to remove the foreign substances by adhering them to the normal filament that has been melted.

If the filament doesn't get extrude or the printing quality is poor even after the use of the nozzle management pin, replace the nozzle since the nozzle has most likely been damaged. Contact tech@inksmith.ca for the nozzle replacement.

4. Cautions regarding the Use of the Nozzle Management Pin

Proper use of the nozzle management pin is a good way to maintain the management of the nozzle. However, since the nozzle management pin goes through the passage in the extruder that the filament goes through, it may cause damage or add more debris to the inside of the extruder. Improper use of the tool may lead to more damages within the extruder or make the clogging more severe. Damage caused this by scenarios listed below may incur a fee not covered by warranty during servicing.

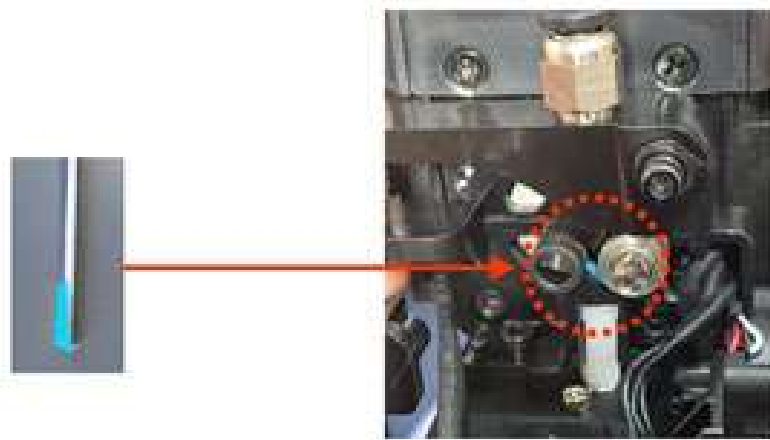
- **Clogging due to Damaged Parts**

If the nozzle management pin is excessively used, it may damage the passage or cause clogging in the nozzle if parts of the passage get broken and lodged. Since it is difficult to clear the clogging of the nozzle that has occurred in such way, the entire nozzle needs to be replaced.

- **Debris Attached to the Nozzle Management Pin**

Don't use the nozzle management pin until you've cleaned it of dust and residue. Remember to push the filament through the nozzle when trying to unclog it, avoid pulling filament out with the nozzle management pin. If filament does get stuck to the pin, clean it off before it can harden.

Check to make sure that the nozzle is clear by inserting filament into the extruder and checking to see if it reaches the nozzle. If the filament fails to reach the nozzle after cleaning, the nozzle must be removed through the disassembly of the extruder.



Example of debris occurring because of the Nozzle Management pin





- Since the nozzle management pin is used while the nozzle is hot, the tip of the nozzle management pin will also heat up. Be careful during handling.
- Be careful while using the nozzle management pin while learning to use the tool.
- Since the improper use of the nozzle management pin can damage the extruder part to the extent that can't be fixed, it is recommended to refrain from the use if the user deems it too difficult.

5. Cleaning the Outside of the nozzle

The nozzle is a part that is heated to a high temperature during printing, and it is usual that a filament residue is melted and adhered to its surface. This can lead to a lower quality print due to uneven temperatures on the nozzle and possible obstructions.

- After heating up the nozzle to the temperature that the filament on the surface would melt, remove the residues on the surface with tweezers, a wire brush or wipe it with cotton cloth that doesn't melt (being careful not to burn yourself)
- If the surface of the nozzle is quite dirty, cool down the nozzle completely, and wipe the surface of the nozzle with a cloth after applying small amount of highly pure acetone. This should melt away the filament even though the power is shut off. Only use the printer after the acetone has completely evaporated (It may be difficult to remove the polluted filament which is made of a material that doesn't react to the acetone).
- Just before printing, a certain amount of the filament is extruded by force in order to print with clean filament. If this strand of filament sticks to the nozzle, it can affect the model so make sure to remove any excess before the printing begins.

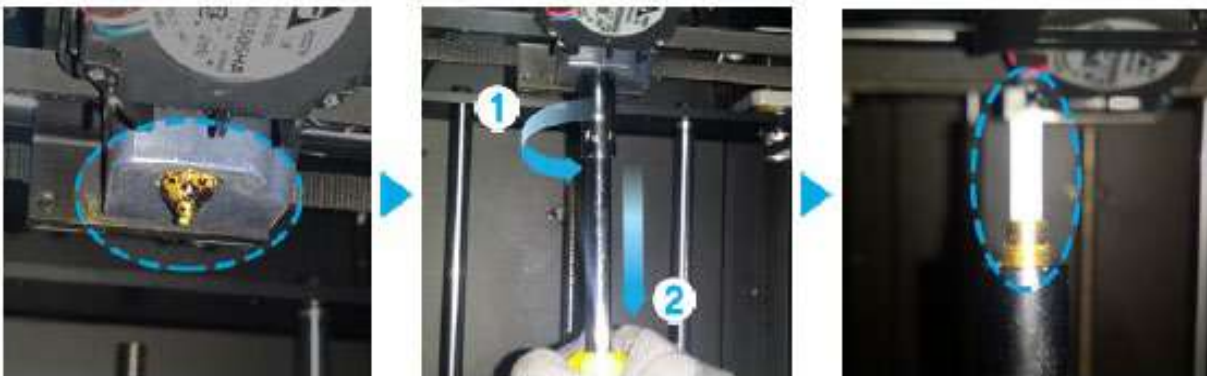
	<ul style="list-style-type: none"> • Printing quality worsens with damage to the nozzle if the nozzle hole is pressed by tweezers. • When acetone is used for cleaning the nozzle, be careful to only apply to the metal nozzle as other parts of the printer and extruder will be affected. • When using acetone, use it in a place where it is well ventilated, and be cautious during handling. • Be sure to follow the safety regulations that are marked on the packaging of the acetone.
	<p>In case of cleaning the nozzle while it is heated, be cautious not to get possible burns by the nozzle that is hot.</p>

Replacing the Nozzle

While the nozzle is can be used for a long time, the lifecycle of the nozzle is limited by possible cracking of the nozzle due to the continuous printing, the carbonization of the filament that remains inside, and the foreign substances. Being as the nozzle gets actively used, it is considered a consumable part and if problems such as the failure to extrude or a severe crack in the filament occur due to problem in the nozzle, the nozzle unit needs to be replaced.

Especially, if the problem doesn't get solved by the items that are stated in the 'Extruder (Management)' section above, it's better to solve the problem by replacing the nozzle kit.

Remove the nozzle kit by turning it counterclockwise by using the provided 8mm box wrench. **Don't try to remove the nozzle with excessive force, you risk damaging the printer.** **Preheat the nozzle before removing** as it is often easier to remove the nozzle this way. (Set the temperature to be 10 to 20 degrees below the recommended temperature for the filament.)



After starting to thread the new nozzle by hand into the hole, tighten the nozzle by turning it clockwise using an 8mm box wrench.



- **Be careful, nozzle will be HOT. Avoid contact with the nozzle until it cools down.**
- **If there is any difficulty in replacing the nozzle kit or there is a risk of damaging the extruder, please request help from tech@inksmith.ca.**

Maintenance of the Heating/Printing Bed

Cleaning for Normal Auto Leveling

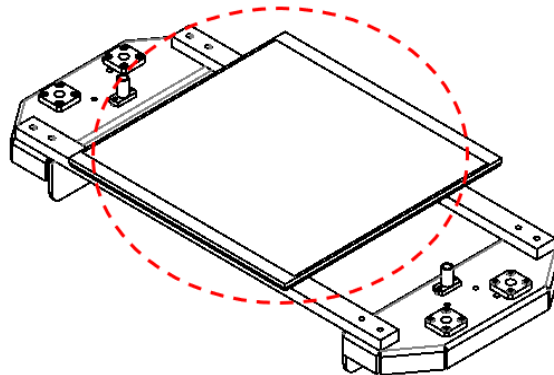
The heating bed is the platform where the 3D model gets printed. This runs smoothly when the exact location of the heating bed is identified. The Makerforge automatically performs a leveling procedure before each print (unless changed in the settings) to identify the location of the bed plane.

Auto Leveling is developed for precise printing by applying a PGM (Plane Geometry Mapping) algorithm which checks the location of the bed by touching the tip of the nozzle to the heating bed and compensates for discrepancies on the presumably flat printing surface by checking the bed location of 9 points on the heating bed surface.

If the surface of the heating bed is dirty or has remnants of past prints on it, a problem may occur during the leveling process which can disrupt the print.

Therefore, management such as regular cleaning of the surface of the heating bed is required after printing.




As for the removal of pollutants on the heating bed, always keep it clean using a scraper and tweezers that are supplied as accessories. When using tools, **be cautious not to damage the surface of the printing bed**. If the surface gets damaged, the print will not adhere well or will over adhere and be difficult to remove as the printbed coating gets peeled off.



The area that is marked with a red circle in the picture is a heating bed part to be cleaned.



When cleaning the printing bed, be sure to perform the task while keeping the power in off state.

	<ul style="list-style-type: none"> • A pattern that looks like a stain may be found on the surface of the printing bed, it is the pattern that occurs during the coating process. Thus, there is no need to worry about using it since it doesn't have any effect on the characteristics of the printing bed. • The lifecycle of the coating on the printing bed may vary according to the printing habit of a user. If the print can is taken off easily, replace the printing bed. • The heating bed of the Makerforge makes the printing without tape or glue possible under appropriate temperature condition when printing with ABS/PLA that are sold by InkSmith. However, if it is desired to print using tape or glue due to the printing habit of a user or the model to be printed, make sure to find instructions on how to use these adhesives for your printing purposes.
	<ul style="list-style-type: none"> • When 3D printing, PLA and other types of filament often contract slightly as it cools. This can lead to gaps between the print bed and the model or completely dislodge the print, causing it to fail. Addition adhesives can be used to help with this as well as adjusting print settings, machine settings, and/or printing with a using skirt or raft base.
	<ul style="list-style-type: none"> • Do not use any solvent other than acetone on the heating bed. Others may cause damage to the coating. • When acetone is used for cleaning the printing bed, be cautious not to apply acetone on the parts other than the printing bed. It would cause damage to the machine. • When using acetone, use it in a well-ventilated area, handle with care and read all instructions and safety regulations on the product. • Since the cleansing component of some wet wipes may disturb the coating of heating bed, never use wet wipes. • Do not disassemble the heating bed or apply excessive force in order to take off a sculpture. The printer or user may incur a shock or damage components.

Replacing the Exhaust Filter



The Makerforge uses a clean, triple-layered filter of Purafil catalyst, HEPA filter and deodorizing filter in order to filter pollutants that may be generated in a FDM type printer.

When the filter gets dirty, it not only lowers the performance of the filter but can also causes damages to the filter fan.

There's only a bit of surface cleaning that can be performed before the filter has been used up and needs to be replaced.

Even though the replacement cycle of the clean filter may vary by the environment of the use and the printing habits of a user, it is recommended to replace it in every 6 months under a typical environment.

For replacement instructions, please refer to '[Replacing the Clean Filter](#)' above.

	<ul style="list-style-type: none">• Be sure to mount a clean filter in the correct direction.• If the filter is mounted the wrong direction, the filter's performance would be lowered and it may damage the ventilation fan.
	<ul style="list-style-type: none">• Only replace a filter when the power is confirmed off.• Be careful not to let any filament debris or other small objects get in that could jam and damage the fan.

Update

The Makerforge firmware can be updated through the following 2 methods.

For smooth and stable use of the device, the latest update is recommended to be installed at all times.

Using a USB Memory Stick

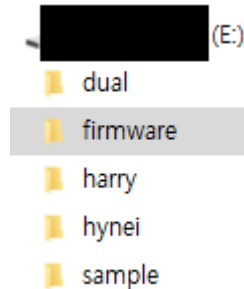


FAT32 / NTFS formats are supported via USB memory stick.
 USB memory format type can be viewed by placing a mouse cursor on the USB memory stick icon in Windows Explorer, right clicking it and selecting Properties.

1. Plug in a USB memory stick and create a firmware folder in the root of the USB memory stick.



The firmware folder must be in the root folder.





2. Download the newest firmware from inksmith.ca
3. Copy the downloaded file to the newly created firmware folder.
4. Remove the USB memory stick from the computer and insert it into the slot on the main panel of the Makerforge.
5. In the Makerforge menu, navigate to Settings → Firmware.
6. Then select the Upgrade(USB) button.

Automatic Update

If the Auto Firmware Update function is activated, and the network settings have been configured, it can automatically upgrade the firmware if there is an upgraded version available when the device is restarted.

1. Navigate to Settings → Firmware.
2. Select the Upgrade(Server) button.

6. Trouble Shooting

	<ul style="list-style-type: none"> • If issues with the printer persist, try factory resetting the printer by going to {Setting > System > Initialize} which will reset all settings and print history or by updating the firmware. • Since print quality may change due to environmental conditions or CuraForCubicon/Slicer settings during the creation of G-Code, adjust and check the quality by using various printing conditions or options.
	<ul style="list-style-type: none"> • If a problem occurs in the device, it is important to clearly identify the situation of the problem occurrence. Retain the model file (STL) and G-Code file, take a picture of the problem or record the video so that they can be referenced during customer support.

Defects of the Device

Filament Can't Be Extruded through the Nozzle.

- Make sure to use good quality filament. If using filament from other sources than InkSmith, make sure to validate that the filament isn't a knock off or of poor quality. Some filaments may cause a problem during extrusion because their listed temperature is different than the true melting point or it doesn't melt properly within the extruder. Damage caused by 3rd-Party Filament is exempt from the free warranty coverage.
- Check whether the supply of the filament is smooth. If the filament is twisted or loosened in the spool, unwind and respool. Since the filament that has been twisted or loosened once, it may continue to cause problems, so it is recommended to keep track and prevent any more binds.
- A filament that has been exposed to humidity or dust may have different characteristics compared to the time it was initially opened. The use of such filament may cause a breakdown such as clogging of the extruder. Use the filament sooner rather than later once it has been opened, and if it needs to be stored, block the humidity and dusts using vacuum bags or sealed containers, and then store it for only a short period of time.
- Check to make sure the filament being used is the correct diameter. The Makerforge only works with the standard 1.75mm diameter filament. Filament may get jammed if a thinner or thicker one is used.
- Filament can get twisted or jammed in the extruder. Filaments with a low printing temperature often encounter this problem. Unload the filament and try to straighten it out, being careful not to break the line, then try printing at a lower temperature.
- Check whether the extruder module is correctly mounted. If there are any problems with the cable connection, not seated properly or it is not firmly fixed, it may become dislodged during operation.
- Check the temperature conditions of the filament and the extruder match.

- Replace the nozzle if it is damaged. A nozzle is a consumable part. Replace it on your own or by using a warranty service (→ [Refer to Replacing the Nozzle](#)).
- The nozzle may get clogged due debris inside the extruder. Regular extruder maintenance is recommended (→ [Refer to Management of the Extruder](#)).

Data in a USB Drive Can't Be Viewed.

- The Makerforge supports FAT32 and NTFS USB file system formats
- It supports G-Code(*.gcode) that has been sliced by the CuraForCubicon and LaunchPad3D. (Formats that are supported by other printers may differ by models. Be sure to use the formats that are supported by your model only.)
- Check whether the file exists normally through a computer.

Data in a USB Drive Can't Be Printed.

- It supports G-Code(*.gcode) file formats that are created in CuraForCubicon and LaunchPad3D.
- The file in the USB drive may be damaged. Create a G-Code file again and use it.
- After slicing, if there is a problem in the process of copying the file to memory, it may not output. Check if the G-Code file is normal. If the print path visible through the G-Code is marked as an abnormal path, the G-Code is invalid.
- The base 3D model may have issues which prevented the slicer from properly exporting a G-Code file. Open the original 3D model and check if there are any slicing issues or normal when converting to G-Code. Then use a separate 3D model checker to check if there is a problem with the 3D model.
- There may be a problem in saving the data in the USB drive due to a security program in the PC being used to transfer the file. Try adjusting settings, using a different computer or a different USB memory stick and retry.

The Print doesn't start because the Auto Leveling Fails.

- Check for a vibration around the printer. If the environment is shaking or vibrating, it can cause the Auto Level to fail.
- Clean the top of the nozzle.
- If excessive force is applied in order to forcibly take off a previous print from the printing bed while the bed is not sufficiently cooled down after printing, the auto leveling may fail if the sensor reaches a lower part of a damaged bed. Be sure to separate the sculpture from the heating bed only after the bed is sufficiently cooled.
- The Auto Leveling may fail due if the temperature using 3rd-party filament is incorrect.
- If a problem continues to occur, request a warranty service after recording or taking video of the auto leveling process.

Printing Gets Interrupted.

- Check the power supply.

The Filament sensor isn't detecting properly.

- Check that the diameter of the filament being used is 1.75mm.
- If the Filament Check function is set to "OFF," it won't detect. Changed the setting to "ON."
- If a filament is flexible, it may not be detected by the sensor. Turn the Filament Check function to "OFF."
- The sensor is near the start of the filament line so try pulling through about 10 cm of filament (enough to think it's reaching the extruder) then try the print again.
- A sensing error may occur if there is residue or debris on the filament. Clean off the filament and carefully clean out the sensor.
- If a problem continues to occur, request a warranty service after recording or taking video of the process.

The Model doesn't stick to the printing bed.

- For best results, use InkSmith Filament. 3rd-Party filament may not stick well to the bed surface.
- A filament that has been exposed to humidity or dust may have different characteristics compared to the time it was initially opened. The use of such filament may cause a breakdown such as clogging of the extruder. Use the filament sooner rather than later once it has been opened, and if it needs to be stored, block the humidity and dusts using vacuum bags or sealed containers, and then store it for only a short period of time.
- Remove debris from the printing bed. Wet wipes may damage the coating of the bed so use a dry cloth or acetone, (→ [Refer to Bed Management](#)).
- Check that the temperature conditions of the heating bed and the extruder are appropriate for the filament being used. The heating bed adheres well when the temperature condition is appropriate for the filament used, and this temperature may vary according to the type of the filament or the model, and the printing environment.
- Check if the area that adheres to the heating bed is too small or the bottom of a sculpture is uneven. Consider using a base support option in the slicer or adjusting the first layer printing speed to be slower.
- If necessary, use an appropriate masking tape. It may be helpful for the adherence of a sculpture to apply a separate heat-resisting tape such as Kapton tape on the heating bed.
- Check the coating of the printing bed for damage or is severely bent. In such case, the glass printing bed must be replaced. The bed is a consumable part. Order a replacement through inksmith.ca or contact support via email: tech@inksmith.ca

Part of the print, mostly the bottom corners lift up from the base or bed.

- Check the situation in [“The Model doesn’t stick to the printing bed”](#) and perform the necessary measures.
- Filament can contract as it cools, can be partially improved through options such as adjusting the infill density, printing at a lower speed, adjust the extruder and bed temperatures, and/or using a base support during slicing.
- Use a material that contracts less.
- Adjust the shape of the model. Rounded edges contract less than square edges. Also, follow any instructions on the printing material provided.

The middle of the print gets cracked.

- Contraction of the material is usually the cause of it. Either adjust the printing condition (temperature of the extruder or the heating bed) or use a material that contracts less.
- Adjust the shape of the model. Rounded edges contract less than square edges. Also, follow any instructions provided on the printing material.
- It can be improved by adjusting infill density.
- It may occur due to the low adherence power because the material is old or it is stored under a poor condition. Replace the material.

The print won’t come off the printing bed.

- Wait until the heating bed is sufficiently cooled down. If you take it off forcibly, it may damage the heating bed.
- The temperature that the print can be released from the bed may vary by the filament, the shape of the model, and the surrounding environment.
- If the print still doesn’t come off even if the bed is sufficiently cooled down (to a room temperature), use a tool with a flat edge underneath the bottom of the sculpture, being careful not to scratch the bed badly.
- Clean off debris left from each print. The current print may be stuck to previous print leftovers. Manage the surface of the heating bed cleanly.
- If the coating of the heating bed is damaged, the heating bed must be replaced. Contact tech support through the inksmith.ca webpage or via email: tech@inksmith.ca.

Even though the Printer says it's complete, only a part of the model has been printed, while some parts haven't been printed or were printed abnormally.

- Check the documentation in '[Filament Can't Be Extruded through the Nozzle](#)', and follow the necessary steps.
- Check the printed model and the G-Code. If the model is abnormal, there may be a problem in the creation of G-Code. Retry after revising the model.
- The model or extruder might interfere with the supports depending on the shape of the model. Adjust the slicing and supports settings.
- Remove any blockages in the nozzle.
- Check '[The Model doesn't stick to the printing bed](#)' and check to see if the model came loose during the, either from losing grip with the bed or being bumped by the extruder.
- If a problem continues to occur even though a model doesn't have a problem, record the issue and contact support through the inksmith.ca website or email: tech@inksmith.ca

7. Product Specification

Model	Optimus-C23
Specification	
Product Size	480(W) x 480(D) x 505(H) mm
Product Weight	~ 20 Kg
Packaging Box	550x540x640 mm
Packaging Weight	23 Kg (including a main body and accessories)
Temperature	
Surrounding Operation Temperature	15 - 35 °C
Storage Temperature	0 - 35 °C
Electricity Related	
<p>The Makerforge doesn't support Free Voltage AC input, and each product will be shipped after the input voltage is set to the voltage used in each country (Refer to AC input below). Please before using the product, make sure to check the voltage range on the product label.</p>	
AC Input 1	100-127V~, 50/60Hz, 7.82-6.16A
AC Input 2	200-240V~, 50/60Hz, 3.91-3.26A
Display	5 inch Touch type TFT LCD
Memory Stick used	USB Memory (FAT32/NTFS)
Network Environment	Wifi (802.11b/g/n, 2.4GHz)
Software	
Supplied Slicing Software	CuraForCubicon (for Windows, MacOS)
Input 3D Design File Formats	.stl , .obj, .3mf
Supported Operating System	Windows 7 (64bit) or higher version

Printing	
Printing Technology	FFF (Fused Filament Fabrication)
Print Volume	232x212x301 mm
Molding Speed	Max 150mm/sec (Low Noise & High Quality Mode)
Layer Height Setting	150~300um, Min 100um
Sculpture Wall Thickness	Optimal 400um+
Filament Diameter	1.75mm
Filament Types	ABS, ABS-A100, PLA, PLA+, PLA-i21, PETG, Flexible Filament
Nozzle Diameter	0.4mm
Degree of Precision of XYZ Position	XY : 3.125um, Z : 1.25um
Max Nozzle Temperature	260°C
Max Heating Bed Temperature	120°C
Certification	KC, CE, FCC