TABLE OF CONTENTS

1. PREFACE .............................................................................................................................................. 4
   1.1 IMPORTANT ...................................................................................................................................... 4
   1.2 WARNING SYMBOLS ......................................................................................................................... 4
   1.3 POWER GRID CONNECTION .............................................................................................................. 4
   1.4 CHOOSING PRINTING LOCATION ..................................................................................................... 5
   1.5 HEATED PARTS ................................................................................................................................. 5
   1.6 MOVING PARTS ................................................................................................................................. 6
   1.7 WHAT TO DO IN PROBLEMATIC SITUATIONS ............................................................................... 6
   1.8 RECYCLING OF PACKAGING MATERIAL AND THE DEVICE .......................................................... 6
   1.9 DECOMMISSIONING OF THE DEVICE AND RECYCLING ELECTRONICS ....................................... 6

2. INTRODUCTION ...................................................................................................................................... 7
   2.1 TOOLS ............................................................................................................................................... 8
   2.2 PREPARATIONS ................................................................................................................................. 9

3. DOWNLOADING AND INSTALLING PRINTING SOFTWARE AND DEFAULT SETTINGS ........................................ 10
   3.1 INSTALLING PRINTING SOFTWARE ............................................................................................... 10
   3.2 PRINTING SOFTWARE SETTINGS .................................................................................................... 10
   3.3 DEFAULT SETTINGS, PRINTER AND PRINTING MATERIAL .............................................................. 13

4. 3D MODEL PREPARATION .................................................................................................................... 14
   4.1 IMPORTING 3D MODEL INTO PRINTING SOFTWARE ......................................................................... 14
   4.2 TRANSFORMING 3D MODEL INTO G-CODE ..................................................................................... 15
   4.3 SAVING G-CODE TO USB FLASH DRIVE .......................................................................................... 16

5. 3D PRINTER PREPARATIONS ................................................................................................................ 17
   5.1 TREATING AND INSTALLING PRINTING BED ................................................................................. 17
   5.2 PLUG IN POWER CABLE AND POWER UP THE 3D PRINTER .......................................................... 18
   5.3 EXTRUDER HEIGHT CALIBRATION ................................................................................................... 18
   5.4 RECIPROCAL EXTRUDER ALIGNMENT (OFFSET VALUE) ................................................................. 20
   5.5 LEVEL CALIBRATION FOR NOZZLE 1 & 2 ...................................................................................... 21
   5.6 MANUAL CALIBRATION ADJUSTMENT ............................................................................................. 23

6. 3D PRINTING ......................................................................................................................................... 24
   6.1 PREHEATING ..................................................................................................................................... 24
   6.2 PRINTING MATERIAL FEEDING/SWITCHING MATERIAL ................................................................. 25
   6.3 CHOOSE FILE FOR PRINTING ......................................................................................................... 28
   6.4 CONFIRM START OF 3D PRINTING .................................................................................................... 28
   6.5 ABORTING PRINTING PROCESS ...................................................................................................... 28

7. MANUAL CONTROLS .............................................................................................................................. 29
   7.1 NOZZLE HEATING ............................................................................................................................. 29
   7.2 PRINTING PLATFORM HEATING ....................................................................................................... 29
   7.3 CASE FAN SETTINGS .......................................................................................................................... 29
   7.4 PRINTING CHAMBER LIGHTING ...................................................................................................... 30
   7.5 MANUAL DRIVE OF AXES ................................................................................................................. 30

8. PRINTING SETTINGS .............................................................................................................................. 31
1. PREFACE

This manual introduces the device and how to operate it in detail. Ensure safe and effective operation by reading the manual before use. Store the manual so that you have easy access to it when needed.

miniFactory Oy Ltd reserves the right to make changes to this manual and the device the manual refers to without advance notification. We have done our best to ensure that the information provided does not contain inaccuracies or gaps.

miniFactory Oy Ltd gives this manual no guarantee, for example, of applicability for any particular purpose or commercial appropriability.

miniFactory Oy Ltd is not liable for any specific or resulting damage caused by use of the manual or errors in it.

miniFactory Oy Ltd is not accountable for any damage, harm or danger caused by parts or objects manufactured using the device.

1.1 IMPORTANT

Do not print objects from certain files that are against the law. For example, printing firearms and ammunition is forbidden.

Device may look slightly different in real life compared to pictures in the manual.

This manual uses Metric System of Measurement.

Notable details have been highlighted with warning symbols

Familiarize yourself thoroughly with the manual before operating the device. Remember to follow safety and operation instructions provided. Newer leave machine alone when power is turned on.

1.2 WARNING SYMBOLS

![Hot parts or components](image)

Hot parts or components

![Harm/danger warning](image)

Harm/danger warning

1.3 POWER GRID CONNECTION

Use only properly installed grounded power sockets with right voltage and current rating. To ensure right voltage, inspect information provided in the power supply plate.

Power supply used in the device is fully compliant with all CE marking directives and rules in effect.
1.4 CHOOSING PRINTING LOCATION

Several things should be noted when choosing printing location:

- Always place the device on a sturdy platform that can carry the full weight, approximately 50kgs. When operated, the device generates motion. This should be noted when choosing printing location.
- Place the device on the platform so that it stands on its own supportive legs. Every leg is required to have similar positioning on the surface.
- Slippery table surfaces are not recommended. Generated motion may cause the device to fall off the surface.
- Make sure that the device has 10 centimeters of space available in every direction when starting printing.
- Do not operate the device unless you have familiarized yourself with this user’s manual and you are aware of risks that are present. Underage person may operate the device only when supervised by an adult who is familiar with the device.
- 3D printer is not a tool for children.
- To avoid harm and dangerous situations, do not leave children alone with the printer without supervision when the printer is operating, has just completed a printing task or is connected to computer and/or power grid.
- Do not leave pets alone with the printer without supervision. Make sure pets do not have access near the printer when the printer is operating, has just completed a printing task or is connected to computer and/or power grid.

1.5 HEATED PARTS

Following things should be noted when operating the device:

- Do not leave the printer without supervision even for a brief moment if it is connected to power grid.
- Tell others about printer-related risks and keep children away from the printer when the printer is active.
- Hot and moving parts can cause harm or danger.
- Hot parts can easily cause burns.
- When you heat the nozzle for the first time, smoke may be generated when protective greasing burns away.
- Make sure the room ventilation is adequate when printing. Some materials used in printing may cause smell.
- Use materials which have been designed for 3D printing. Materials designed for other purposes than 3D printing may contain toxic components.
- Do not touch heated parts when the printer is active, they will be burning hot.
- Nozzle temperature may rise to over 300 degrees Celsius and the risk of severe burns is present.
- The printer extrudes hot and molten printing material which can cause burns.
- Heated printing bed temperature may rise to over 100 degrees Celsius and may cause burns.
- Motor parts that generate motion in the printer may have temperatures of over 70 degrees Celsius and may cause burns.
- When you have switched printer power off, let the printer cool down for 30 minutes before touching heated parts.
- Do not place combustible or flammable materials on the device or near it.
- Contact info@minifactory.fi, if you notice damaged parts or components.
- Perform general maintenance, cleaning and repair procedures when the device has cooled down and is disconnected from power grid.
• Do not cover the product before it has completely cooled down and has been disconnected from the power grid.

1.6 MOVING PARTS

⚠️ Do not touch moving parts when the printer is active or connected to power grid. Do not let your hair or clothing get caught into the motors or moving parts.
If mechanical movements jam during operation, switch power off and disconnect the device from power grid.
Be cautious and do not hurt yourself when examining the printer trying to find out what caused a problem.
Mind your hands and make sure there are no objects blocking any moving parts to avoid risk of physical harm and equipment damage.

1.7 WHAT TO DO IN PROBLEMATIC SITUATIONS

If the printer malfunctions, ensure your own safety first by switching power off and letting the printer cool down for at least 30 minutes before starting troubleshooting.

When performing repairs, be extra careful not to damage your printer or injure yourself.

Nozzle structure maintenance is performed when the nozzle is hot. Be extra careful that you or others that are present do not get hurt.

Check power cables regularly and make sure the cables are properly connected.

Troubleshooting guide can be found from final pages of this User’s Manual.

miniFactory technical support provides assistance with troubleshooting.

1.8 RECYCLING OF PACKAGING MATERIAL AND THE DEVICE

 окружающая среда

Product package is manufactured from environmentally friendly materials, and can be disposed of in compliance with recycling regulations in effect.
Inquire your local disposal or recycling service point for assistance when your printer is at the end of its life cycle or needs to be disposed for another reason.

1.9 DECOMMISSIONING OF THE DEVICE AND RECYCLING ELECTRONICS

The device has been designed to endure normal use for multiple years.
Following household waste disposal procedure is not the correct way to dispose of your device. Dispose of it properly by delivering it to your local waste recycling point.
The device contains many valuable materials and components that can be salvaged or recycled, make sure you deliver it to your local waste recycling point.
2. INTRODUCTION

DISPLAY PANEL
CONTROLLER
PRINTING CHAMBER
PRINTING CHAMBER DOOR
EXTRUDER 2 (RIGHT)
EXTRUDER 1 (LEFT)
FILAMENT FEED 1&2
REEL HOLDER 1 & 2
USB INTERFACE (V-DRIVE)

ACTIVATED CARBON FILTER
POWER CABLE INTERFACE
POWER SWITCH
USB CABLE FOR COMPUTER CONNECTION
2.1 TOOLS

The device is supplied with a bag that contains several useful tools and utilities. Bag contents ease the handling and usage of printing platform and separating printed objects from the heated bed. It is also possible to use your own tools if needed.

- **USB stick** for 3D printing with minifactory Innovator.

- **Printing bed adhesive** for securing objects to the printing bed to prevent warp. Directions for use can be found in this manual. **Optimal for PLA.**

- **Allen keys** for detaching printing bed among other things.

- **Scraping tool** for separating printed objects from the printing bed.

- **Adhesive applicator** for spreading printing bed adhesive into thin and smooth layer on the printing bed.
2.2 PREPARATIONS

**Reel holder installation**

- Install reel holders (2 pcs) to the left side of the device, when viewed from the front.
- Installation is performed by twisting the holders into their place as pictured below.

**Printing material reel installation**

Perform printing material reel installation as pictured below. Please note direction of rotation.
3. DOWNLOADING AND INSTALLING PRINTING SOFTWARE AND DEFAULT SETTINGS

Required software package download:
http://www.minifactory.fi/files/innovator.zip

After download is complete, extract files and profiles from innovator.zip into desired folder. Open the folder and move on to next phase.

3.1 INSTALLING PRINTING SOFTWARE

Go to innovator folder.

1. Install SetupRepetierHost_1_6_2
2. Choose English as installation language (Recommended)

3. Choose components to be installed
   - Associate Files – choose all
   - UNTAP following:
     a. Repetier-Server
     b. Use Legacy 3D library
     c. Skeinforge Slicer.

3.2 PRINTING SOFTWARE SETTINGS

Start Repetier-Host printing program. Choose language: English (Recommended)

Switch Easy Mode off (Red) and move on to Printer Settings tab

Input values shown in the pictures on page 11&12
The printer settings always correspond to the selected printer at the top. They are stored with every OK or apply. To create a new printer, just enter a new printer name and press apply. The new printer starts with the last settings selected.

- **Printer**: Factory Innovator
- **Serial Connection**: COM 1
- **Baud Rate**: 115200
- **Transfer Protocol**: ASCII
- **Reset on Emergency**: Send emergency command
- **Receive Cache Size**: 127
- **Communication Timeout**: 40 [s]

The following settings are specific to the printer:

- **Travel Feed Rate**: 2400 [mm/min]
- **Z-Axis Feed Rate**: 900 [mm/min]
- **Manual Extension Speed**: 2 [mm/s]
- **Manual Retraction Speed**: 3 [mm/s]
- **Default Extruder Temperature**: 200 °C
- **Default Heated Bed Temperature**: 60 °C

- **Check Extruder & Bed Temperature**:
- **Remove temperature requests from Log**: Check every 3 seconds.

The printer is currently in **Park Position**: X: 155, Y: 200, Z: 0 [mm].

- **Add to comp. Printing Time**: 8 [%]
- **Invert Direction in Controls for**: X-Axis, Y-Axis, Z-Axis, Flip X and Y

To control the printer, you can:
- Send Eta to printer display
- Go to Park Position after Job/Kill
- Disable Extruder after Job/Kill
- Disable Heated Bed after Job/Kill
- Disable Motors after Job/Kill
- Printer has SD card
Save settings by clicking **APPLY** and **OK**.
3.3 DEFAULT SETTINGS, PRINTER AND PRINTING MATERIAL

Settings may differ from user to user. In educational use, every unique user with login credentials should configure necessary settings before using the device.

1. **Configuration** menu
   a. Start **Repetier-Host**
   b. Move on to **Slicer** tab
   c. Activate **CuraEngine**
   d. Proceed to **Configuration** menu

2. **Importing printer settings**
   a. Choose **Cura**
   b. Choose **Print**
   c. Click **Import**
   d. Proceed to **innovator** folder
   e. Choose **miniFactory Innovator-Cura.rcp**
   f. Click **Open**

3. **Importing printing material settings**
   a. Choose **Cura**
   b. Choose **Filament**
   c. Click **Import**
   d. Proceed to **innovator** folder
   e. Choose desired material settings (For example **Innovator-ABS.rcf**)
   f. Click **Open**
   g. (Import additional material settings by repeating steps 3C-3F if needed)
   h. Close settings menu by clicking **Close**.

4. **Activating Innovator settings**
   a. Choose tab **Slicer**
   b. Activate **miniFactory Innovator-CURA** profiles from Print Configuration tab
4. 3D MODEL PREPARATION

3D printer prints objects from digital 3D models. 3D model can be created using any CAD software that supports **.STL file format**. Repetier-Host printing program creates a G-code from the 3D model. The G-code determines needed trajectories for printing the object using 3D printer.

4.1 IMPORTING 3D MODEL INTO PRINTING SOFTWARE

Start Repetier-Host printing software.

1. Proceed to **OBJECT PLACEMENT** tab.

2. Click **+** and choose .STL file for printing.

**Choose the extruder you want to use (1 or 2).** You can also inspect, move, duplicate or rotate your 3D model with the following buttons:

1. Copy/duplicate
2. Autoposition 3D model
3. Center 3D model
4. Scale 3D model size up or down
5. Rotate 3D model
6. Inspect 3D model by pressing and holding mouse button and rotating.
7. Move platform
8. Move 3D model
9. Zoom platform / 3D model
10. Choose viewing angle
4.2 TRANSFORMING 3D MODEL INTO G-CODE

3D model is transformed into G-code which the printer utilizes to print the object. Your 3D printer will print the object using the exact settings and configurations you have provided. There are numerous parameters but Slicer tab provides everything you need.

1. Proceed to Slicer tab.
2. Choose CuraEngine.
3. All parameters and settings for 3D printer and printing material. ("PRO configuration")
4. Choose miniFactory Innovator-CURA. (Printer configuration)
5. Object adhesion (BRIM is recommended for ABS, NYLON, PC)
6. Layer quality: 0.2mm is recommended. (0.02mm – 0.4mm available)
7. Use of support material (Touching Bed = from the platform, Everywhere = all holes)
8. Print speed: 45mm/s is recommended, even slower for smallest objects.
9. Infill density: 20% is recommended.
10. Object cooling: ON is recommended.
11. Choose printing material (Extruder 1 and 2).
12. When you are done with settings press Slice with CuraEngine to create G-code.

![Image of Slicer tab settings]
4.3 SAVING G-CODE TO USB FLASH DRIVE

When G-Code creation is complete, you will automatically move to PRINT REVIEW tab where you can examine object statistics and save it to a USB flash drive.

1. Move to Print preview tab.

2. Edit G-Code manually (Not recommended)

3. Click Save to File and save it to your Computer. After that you can copy it to your USB flash drive.

When saving a file directly to USB flash drive it may not work properly.

4. You can now check object statistics.

5. Examine how the object will be printed layer by layer.
5. 3D PRINTER PREPARATIONS

5.1 TREATING AND INSTALLING PRINTING BED

When using first time the platform is already treated for PLA. Printing bed requires surface treatment for increased friction to ensure proper object adhesion. Many types of surface treatment options have been invented. **Different printing materials need different adhesives.** ABS, PC and NYLON -> WOLFBITE ADHESIVE PRODUCTS. More tips and tricks can be found from the Internet.

**Detach printing bed from the printer before surface treatment.**
- Loosen all six screws holding the bed in place.
- Slide glass platform out of its slot.
- Perform necessary treatment and let the adhesive glue dry.
- Return the glass platform into its slot. Tighten carefully starting with the rear holder screws.

**When printing with PLA** apply a layer of miniFactory Adhesive Glue on clean glass platform. One layer will last for several prints, usually approximately ten. If object adhesion is inadequate or surface is worn out, detach glass platform, wash with dishwashing liquid, let the platform dry and re-treat the surface.

1. Apply adhesive glue on clean glass platform. 2-3 clods the size of a 2€ coin is a good choice.
2. Use adhesive applicator tool to spread the glue smoothly over the whole surface.
3. Let the glue dry for 15 minutes, it will turn transparent.
4. Return the glass platform into its slot. Tighten carefully starting with the rear holder screws.
5.2 PLUG IN POWER CABLE AND POWER UP THE 3D PRINTER

POWER switch also works as the RESET switch in the device. If you are encountering problems, switch power off and wait 30 seconds before restarting.

1. Make sure that I/O switch is set to O.
2. Plug power cable into power cable interface and the other end to a grounded power socket. It is recommended to use uninterruptible power supply to protect your device from power failure and power spikes.
3. Power up the device by switching I/O switch to I.
4. Power is on when lights in printing chamber and display are on.

5.3 EXTRUDER HEIGHT CALIBRATION

Extruder height calibration has to be performed when the device is used for the first time, when printing platform has been switched or object sticks to printing platform only partially or not at all.

Make sure that the printing bed is in its place and empty. You will need an ordinary A4 paper sheet which is utilized in distance measurement.

Display controller is located at the lower right corner of the display.

Turning the controller enables you to navigate in the menus.
By carefully pushing the controller forward you can activate selected menu or function.

1. Go to MENU

2. Click CALIBRATION

Calibration procedure measures height from 9 different points. The measurements are used to systematically implement corrections if the printing bed is gradient.

The printer drives extruders towards point 1 and stops the drive 4mm before contacting the printing bed.
3. Place A4 paper sheet between printing bed and extruders. Carefully turn the controller left to raise printing bed towards the extruders. Move the A4 paper sheet back and forth at the same time with your other hand. 

When the paper sheet scrubs between extruder and printing bed the height is optimal.

4. A value can be seen on the display which is printing bed’s distance from “zero point”. The value is commonly between 0.10 and 3.00. Save the value to memory by clicking controller forward.

5. Extruders will move to point 2. Turn the controller until you can barely move the paper sheet. NOTE! Use the paper sheet to check that the extruder height alignment is identical. If the alignment is not identical, reciprocal extruder alignment needs to be performed first. MOVE TO SECTION 5.4

6. When the extruders are aligned and the distance has been measured using the paper sheet, click the controller to save the value to memory.

Repeat the procedure for all 9 measurement points.

Calibration is now complete!
5.4 RECIPROCAL EXTRUDER ALIGNMENT (OFFSET VALUE)

When printing with 2 extruders (bicolored object/need for support material) it is essential for success that one extruder knows its own location and is aware of the other’s location. In most cases these presented offset values can be used when performing alignment to reach adequate accuracy. Due to structural differences values may have minor differences between printers.

1. Click **MENU - > EXTRUDER OFFSET**

2. Offset values for alignment:
   
   N2 Offset X: **024.30**  
   N2 Offset Y: **000.00**

3. Adjusting values and the effect of adjustments.

   **Value X** adjusts location of extruder 2 in accordance with the X-axis of extruder 1, from RIGHT TO LEFT.

   **Value Y** adjusts location of extruder 2 in accordance with the Y-axis of extruder 1, from FRONT TO BACK.
Nozzles have been calibrated to the same level at the factory. It is possible that they may loosen in use and their alignment may change. When using both nozzles for printing and you notice alignment difference between the nozzles, level calibration has to be performed.

First ensure that filament is not fed into either of the nozzles because the nozzle compartment will not move unless both nozzles are empty. Molten or partially molten material inside the nozzle does not affect the process.

1. Remove nozzle casing by unscrewing both screws using Allen key.
2. Heat both nozzles up to 200 degrees Celsius to prevent calibration inaccuracies caused by solidified printing material in the nozzle point.
3. Begin level calibration. -> MENU -> ADJUST NOZZLES
4. Printer will drive nozzles very close to printing bed level.
5. Loosen nozzle compartment screws from both sides and carefully push NOZZLE1 towards printing bed until you can see it’s against deflector. Tighten the NOZZLE1 retainer screw.
   * When printing only with one nozzle -> Carefully push NOZZLE2 up and tighten the NOZZLE2 retainer screw. (Height difference between the nozzles is 0,5-1,0mm.)
   * When printing with both extruders carefully push NOZZLE2 towards printing bed. Optimal setup is NOZZLE1 is little bit upper than NOZZLE2.
6. Place A4 paper sheet under the nozzles and turn the controller left until you can feel the paper mildly chafe the nozzle.
7. Make sure the heights of the nozzles are optimal before continue.
8. If the nozzle levels are not optimal, loosen retainer screws and tighten at the same level again.
9. When calibration is complete, turn the controller right to cease the nozzle from chafing the printing bed and click the controller to confirm level calibration.
10. Perform **Nozzle height calibration (CALIBRATION)**
11. Re-attach nozzle casing and screw both screws back using Allen key.
5.6 MANUAL CALIBRATION ADJUSTMENT

Calibration values can be adjusted manually after nozzle height calibration if the printed object does not stick to printing bed properly.

NOTE! After Calibration (Section 5.3) a test print should be performed to make sure distance values from different measurement points are accurate. Manual calibration adjustment procedure should never be performed before verifying the calibration measurement point values. Proceed to next section in the manual and return to this Section if printed object does not stick to printing bed properly.

If you notice that object is not sticking to printing bed properly or nozzle is too close to printing bed, you can perform manual calibration adjustments. Memorize the zone causing problems.

1. Click Menu -> Tune Calibration

2. Choose the point value you want to manually tune by turning and clicking the controller. EXAMPLE: P8: 1.30

   P1, P2, P3 listed in the display correlate with the measurement points shown below and in Section 5.2

   Note! If every value is 0.00, move to Section 5.3 and perform extruder height calibration!

3. Turn the controller and choose desired value by clicking. Be careful when adjusting nozzle closer to the printing bed. Nozzle may be damaged if it collides with the printing bed. It is recommended to adjust 0.05 – 0.10 at one time.

   Decreasing the value brings nozzle TOWARDS the printing bed.
   Increasing the value moves nozzle AWAY from the printing bed.
6. 3D PRINTING

3D printing is performed using display. A USB flash drive that contains a 3D model file in G-Code format created using Repetier-Host software is required. If you lack a saved 3D model file with mentioned preferences, move to Section 4.

6.1 PREHEATING

1. Click **START PRINT**

2. Choose nozzle and printing platform preheating according to the material type you will be using in the print. Double check material reel markings for material type and printing temperature.

When printing with ABS, NYLON or PC please activate the preheat 30min before actual printing get started.

Click the controller to task nozzles and the printing bed to commence preheating up to the following temperatures:

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>NOZZLE TEMPERATURE</th>
<th>PRINTING BED TEMPERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preheat PLA</td>
<td>200°C</td>
<td>60°C</td>
</tr>
<tr>
<td>Preheat PLA + SUP(PORT)</td>
<td>200°C + 230°C</td>
<td>60°C</td>
</tr>
<tr>
<td>Preheat ABS</td>
<td>255°C</td>
<td>130°C</td>
</tr>
<tr>
<td>Preheat ABS + SUP(PORT)</td>
<td>255°C + 240°C</td>
<td>130°C</td>
</tr>
<tr>
<td>Preheat NYLON</td>
<td>265°C</td>
<td>85°C</td>
</tr>
<tr>
<td>Preheat PC</td>
<td>310°C</td>
<td>130°C</td>
</tr>
<tr>
<td>Preheat MAX</td>
<td>390°C</td>
<td>130°C</td>
</tr>
</tbody>
</table>
Choose desired function:

**LEFT NOZZLE (1)**

**FILAMENT OK** -> Your choice of printing material has been fed into nozzle (1).

**CHANGE FILAMENT** -> You want to change the material in nozzle (1)

**FEED FILAMENT** -> Nozzle (1) is empty. Feed material of your choice.

**FEED THE FILAMENT**

1. Click **FEED THE FILAMENT**

2. Drive gear of nozzle (1) starts rotating and pushing filament towards nozzle when set PREHEAT temperature has been reached.

**DO NOT CLICK!**

3. Feed filament (PLA) into nozzle feeding tube 1. The filament needs to travel for approximately 1 meter, you need to keep pushing the filament into the tube until it goes no further.
4. Open printing chamber door. **BEWARE OF HOT NOZZLE!**

5. Lift nozzle feeding tube up.

6. Pull approximately 10cm of filament through the tube.

7. Insert filament into the guiding tube hole.

8. Push filament down using moderate force. Drive gear is spring strained and a certain amount of pressure is required. When the drive gear gains a proper grip, it will start pushing filament towards nozzle.

9. When you can feel that the material starts moving, you can stop pushing and put the tube back into its place. Close printing chamber door.

10. Do not click the controller before you can see printing material coming through the nozzle. Filament feeding will stop.

11. Remove excess printing material from the tip of the nozzle. **BEWARE OF HOT NOZZLE!**
CHANGE THE FILAMENT (Switching printing material)

1. Click **CHANGE THE FILAMENT**

2. Drive gear starts rotating and retracting filament from the nozzle.

   **DO NOT CLICK UNTIL FILAMENT IS OUT OF THE NOZZLE.**

3. Open printing chamber door.

4. Lift nozzle feeding tube up.

5. Carefully pull filament out of the nozzle.

6. If you feel that filament is stuck, you can manually loosen drive gear spring by pushing down the disc on the side.

7. Pull filament out of nozzle feeding tube and reel it back.

8. Click the controller to stop filament retraction.

9. Drive gear starts to rotate forward to feed filament into nozzle.

Select material of your choosing and follow instructions provided in FEED THE FILAMENT section.
6.3 CHOOSE FILE FOR PRINTING

1. Insert USB flash drive into USB interface.

2. Choose file you want to print.

**NOTE!** Choose a file you have saved as G-Code yourself to make sure right material and configurations are in place.

If G-Code contains ABS settings and you are using PLA, the print will fail and you might end up with a clogged nozzle.

6.4 CONFIRM START OF 3D PRINTING

When you have completed preparations presented above, you are required to confirm that you want to start the print. After confirmation the 3D printer will heat nozzles and printing bed before starting. This might take up to 5 minutes, do not switch power off if you are not seeing activity right after confirming the start.

6.5 ABORTING PRINTING PROCESS

During printing you can abort the print, pause it or change material. If the print is aborted it cannot be continued.

You can follow the print progress from 0 to 100% from the display.

**PAUSE PRINT** -> Print is now paused and you are moved to pause menu.

**ABORT PRINT** - > Print has been aborted and you are moved to start menu.

**PAUSE MENU**

**RESUME PRINT** -> Print is now resumed.

**CHANGE N1/N2 FILAMENT** -> Change material for nozzle 1 or 2

**ABORT PRINT** – Print has been aborted.
7. MANUAL CONTROLS

7.1 NOZZLE HEATING

1. Choose nozzle 1 or 2 and click the Controller.
2. Set temperature of your choosing and confirm by clicking controller.

7.2 PRINTING PLATFORM HEATING

1. Choose printing bed and click the Controller.
2. Set temperature of your choosing and confirm by clicking the controller.

7.3 CASE FAN SETTINGS

Printing chamber case fans can be used to passively affect printing chamber temperature. CASE FAN COLD fan settings are in effect when nozzle printing temperature is under 240°C. CASE FAN HOT fan settings are in effect when nozzle printing temperature is over 240°C.

1. Choose thermometer icon and click the controller.
2. Choose CASE FAN you want to adjust.
3. Set desired value and confirm the selection by clicking the controller.

CASE FAN TOP fans air out of the device. (Lower value raises chamber temperature. Recommendation 40 or more.) CASE FAN BOT fans air inside the device.
7.4 PRINTING CHAMBER LIGHTING

1. Choose thermometer icon and click the controller.
2. Choose switch LED on/off

![Image of switch LED on/off]

7.5 MANUAL DRIVE OF AXES

1. Click **MENU**
2. Click **MANUAL DRIVE**
3. Choose desired axis and move it by turning the controller.
8. PRINTING SETTINGS

3D printer is not a "smart device", the user needs to know how different parameters affect the printed object. When using PLA material, the default settings go a long way, but when you are printing with industrial plastics, the parameters can have sizable effect on the result. Object geometry affects printing parameters so there is not a single perfect solution for any one object when it comes to settings.

The purpose of this section is to give a picture how different printing parameters affect the printed object. Trial and error are the best learning methods to get acquainted with geometries that require parameter adjustment.

8.1 3D PRINTING MATERIALS

Different printing materials require different temperatures and settings. We have listed the most common printing materials and certain requirements and preferences for successful prints.

**PLA** is a basic printing material that requires adequate object cooling, but is quite easy to use in general. Layers stick together well and smoothly. Material is very hard and does not bend well, but is unable to withstand temperatures of over 60 degrees Celsius without softening. PLA is biodegradable and very suitable choice for creating prototypes and object duplicates. PLA layers are usually very precise and the material is easy to use in printing.

**ABS** plastic is used to make car bumpers among other things. ABS excels in printing small objects. ABS is commonly used in industrial applications due to its robustness. ABS printing temperatures may vary from 240 to 270 degrees Celsius. Optimal temperature depends on used layer height, printing speed, object geometry and filament color. To get the best result, every color and setting combination should be tested to find the optimal temperature. Using ABS can be challenging due to its tendency to shrink. When printing large objects, shrinking may cause layers to separate and create visible cracks in the surface. ABS requires steady and high temperature in the printing chamber. Right temperature decreases cracking and warping usually caused by rapid drops in ambient temperature. If the object cracks, the solution can be sought also from geometry changes. Thicker layers, adjusting infill or slowing down printing speed are good options to start with. One perfect solution does not exist, testing different combinations is the way for successful prints.

**NYLON** is known for its high tensile strength and high durability. On top of this Nylon is elastic and tends to return to its original form after twisting or bending. Technical attributes of Nylon are very promising. Tensile strength may reach 16 533 psi / 114MPa. Breaking strain value may be up to 120%. When printed object is required to have these attributes, but also durability and transparency, Nylon is the right choice. Recommended printing temperature is between 250 and 280 degrees Celsius. Optimal temperature may vary depending on layer thickness, printing speed and object geometry. High temperature ensures that layers stick to each other properly and remain attached.
8.2 EDITING PRINTING SETTINGS

Printing settings can be edited in Slicer tab and Configuration menu

1. Move to Slicer tab
2. Configuration menu (All parameters)
3. Slicer tab settings (Adhesion type, Quality, Support type, Speed, Infill Density, Extruder 1 / 2)
4. Choose Cura
5. Choose do you want to edit printer (Print) or printing material (Filament) settings
6. Choose profile you with to edit
7. Save changes
8. Name and Save new profile. (RECOMMENDED)
9. Import settings (You can import default settings from innovator folder if needed, section 3 and 3.3)
8.3 ADHESION TYPE (ADDITIONAL ADHESION BETWEEN OBJECT AND PRINTING BED)

This setting can be utilized when the section of the object facing printing platform is particularly small. In most cases the problem can be solved by rotating the object in such manner that a larger smooth surface is facing the printing bed. **BRIM** and **RAFT** structures need to remove after the printing is completed, use of **BRIM** or **RAFT** is recommended with ABS, NYLON, PC etc.

- **Brim** – Add supportive brim at the base.
- **Raft** – Add supportive construction, a raft.

8.4 QUALITY (OBJECT LAYER HEIGHT / SURFACE QUALITY)

Layer height affects the quality of object’s outer surfaces. Default layer height setting is 0,2mm, which is typically enough. By adjusting layer height from 0,2mm to 0,1mm surface quality will be smoother but the printing process takes twice as long because the amount of layers needed for completion is doubled.

If you want thinner layers you can adjust the settings in **SLICER -> CONFIGURATION -> SPEED AND QUALITY -> QUALITY** tab.

Picture on the left provides examples of different Quality settings and the effect on printing time.
8.5 SUPPORT TYPE (SUPPORT MATERIAL STRUCTURE)

Printing software is able to create necessary support material structures underneath the object without the user designing them. Support material structure can be created using same material used in printing the object or specific support material designed for the purpose.

Picture of object on the left has support structure attached to it, picture on the right shows the object after removal of the support structure.

Support Type is selected in Slicer tab before the creation of G-Code.

- **Touching Bed** – Support structure will use printing bed as base (RECOMMENDED)
- **Everywhere** – Support structure will be utilized at any point where angle is more than 45 degrees.
Support type settings can be edited in Configuration -> Structures menu.

**Support Pattern** -> Pattern type used in support structure.

**Overhang Angle** -> Every angle exceeding given value will be supported with support material structure.

**Fill Amount** -> Amount of material used in the infill of printed support structures.

**Distance XYZ** -> Distances between object and support structures.

**Extruder selection for support material.**

**Configuration -> Extrusion menu.**

**Support Extruder:** Extruder used in the creation of support structures.

**Create Wipe and Prime Tower:** A “tower” will be created next to the object which is utilized to clean the extruder.

You can examine automatically designed support structures after the creation of G-Code before starting your print in *Slice with CuraEngine - preview tab* and make changes manually if needed.

8.6 INFILL DENSITY (OBJECT INFILL)
Infill Density can be used to affect object weight and material consumption. Printed object can be dense or hollow, printing software can determine infill preferences. Setting affects centermost layers, with default settings the result will be solid 0.8mm top and bottom.

**Infill Density can be adjusted in Slicer tab.**

Illustrations of objects printed with 0, 20 and 60% Infill Density. Object is a completely solid cube.

Object printed using **20% INFILL DENSITY**.

Object printed using **60% INFILL DENSITY**.

Object printed using **0% INFILL DENSITY**.
8.7 STRUCTURES (OBJECT STRUCTURES/ALL PARAMETERS)

You can adjust other parameters in Configuration tab.

NOTE! Every parameter has a purpose, altering even one parameter can have sizable effects when operating the device! You can always load default settings. (section 3 and 3.3)

SPEED AND QUALITY

You can adjust printing speed and create new layer thickness settings. Printing speed options found in the settings are recommendations, exceeding them may damage your 3D printer and reduce print quality significantly.

STRUCTURES

SHELL THICKNESS

Nozzle diameter has to be noted when choosing shell thickness for object walls. To achieve best wall quality for objects using default nozzle (0.4mm), values divisible by 0.4 need to be used.

Shell thickness: 1.2mm (3 rounds)

Shell thickness: 0.4mm (1 round)

TOP / BOTTOM THICKNESS

This setting determines surface solidity for top and bottom. The setting is divisible by 0.2 if 0.2mm layer thickness is used.

Bottom thickness 0.8mm (4 layers)

Bottom thickness 0.2mm (1 layer)
**INFILL PATTERN**

Determines pattern which is used to fill centermost parts of the object.

- **Automatic/Grid**
- **Lines**
- **Concentric Lines**

**SOLID / TOP INFILL**

Determines the solidity of object’s top and/or bottom. If you were to print a solid cube, a few adjustments can turn it into a cup or container item without editing the 3D model.

- Solid Top Infill: NO
- Solid Bottom Infill: NO

- Solid Top Infill: NO
- Solid Bottom Infill: YES
  - Infill Density: 20%

- Solid Top Infill: NO
- Solid Bottom Infill: YES
  - Infill Density: 0%
9. DEVICE MAINTENANCE

9.1 BASIC MAINTENANCE

The most important maintenance procedure is greasing of consumable parts which will ensure printer longevity.

**Grease these parts once every month.**

- Ball screws: MOBIL GREASE XHP222 or equivalent
- Linear conductors: MOBIL VACTRA OIL NO.2, ISO VG68
- End bearings of axes: Sewing machine oil or equivalent thick oil.

9.2 SOFTWARE UPDATES

Software updates for the device are published occasionally. Customers will receive e-mail notifications of available updates.

**Updating software:**

1. Download update files to your computer.
2. Unpack compressed files.
3. Copy extracted file (`MFFIRMWR.HEX`) to USB flash drive root, not inside a folder.
4. Switch 3D printer power off.
5. Input USB flash drive containing software update file into 3D printer’s USB interface.
6. Switch 3D printer power on.
7. Green light next to USB interface starts to blink.
8. **Updating might take several minutes. DO NOT SWITCH POWER OFF!!**
9. Update install is complete when device lights are lit and normal start menu is visible in the control display.
10. Software update file type changes from .HEX to .HEF after install, it can only be used once.
11. If update install is unsuccessful, perform install again.
9.3 CHANGING NOZZLE

When changing nozzle the nozzle will be hot. Exercise caution when performing nozzle change.

1. **Start Print -> Preheat ABS** -> If there is printing material in the nozzle, remove all of it. (Change filament).

2. Use Allen key to unscrew nozzle retainer screw.

   **NOTE!** The screw is deep in the screw thread and is not visible. Sensor and resistor screw threads are on the side and nozzle retainer screw is situated at front.

3. Use pliers to grab a hold of the resistor disc and carefully pull it off from its spot to reveal the nozzle. If the nozzle is not hot, melted printing material will prevent removal of the disc.

4. Carefully unscrew the nozzle and replace it with another.

   **NOTE!** When loosening or tightening the nozzle be careful not to flatten the nozzle. Only the crest of the nozzle can be touched, the construction is very thin.

5. Screw the retainer screw back to its place and tighten lightly.

   **NOTE!** Too much force renders the nozzle useless.
9.4 TIGHTENING BALL SCREWS

Motion generated by the motors is transferred to ball screws through drive components. Ball screw is attached to the component with screws that may loosen over time. This will cause lack of precision because entire force is not transferred to the ball screw. It is beneficial to check and tighten drive parts when performing maintenance.

**Tightening guide:**

1. Switch power off.
2. Unscrew all four top screws and remove the top.
3. Check screw tightness of ball screws in axes X, Y and Z.

**NOTE!** Only operate with power OFF. When power is switched off, you can rotate the ball screws to see the screws properly. Screws can be found from both sides in the ball screw.
## 10. TROUBLESHOOTING GUIDE

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>POSSIBLE CAUSES</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device does not power up/display does not light up.</td>
<td>Power cable is not plugged in.</td>
<td>Plug in power cable.</td>
</tr>
<tr>
<td>Device does not recognize USB flash memory.</td>
<td>USB flash drive is not compatible with the device.</td>
<td>Use different USB flash memory.</td>
</tr>
<tr>
<td></td>
<td>USB flash drive does not contain files.</td>
<td>Add file to USB flash memory.</td>
</tr>
<tr>
<td></td>
<td>USB flash drive contains too many files.</td>
<td>Wipe USB flash memory.</td>
</tr>
<tr>
<td></td>
<td>File name is too long.</td>
<td>Recommendation is 5 characters.</td>
</tr>
<tr>
<td></td>
<td>File format is wrong or not supported.</td>
<td>G-code file format is required.</td>
</tr>
<tr>
<td></td>
<td>Error in USB interface.</td>
<td>Switch power off. Wait 1 minute. Restart.</td>
</tr>
<tr>
<td>Printing material is not coming through when I feed it to the nozzle.</td>
<td>The device is not in filament feeding mode.</td>
<td>Move to feed filament section.</td>
</tr>
<tr>
<td></td>
<td>Nozzle is not heated.</td>
<td>Preheat preheats the nozzle.</td>
</tr>
<tr>
<td></td>
<td>Nozzle motor does not push the filament.</td>
<td>Make sure that the device is in feed filament mode.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Make sure that the filament travels all the way to the nozzle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nozzle temp is too low for the material.</td>
</tr>
<tr>
<td>Printing material does not stick to the printing bed.</td>
<td>Nozzle height calibration has not been performed or it was unsuccessful.</td>
<td>Perform height calibration for the nozzles.</td>
</tr>
<tr>
<td></td>
<td>Printing bed has a zone with wrong calibration value. (material does not stick to the bed)</td>
<td>Adjust zone value in tune calibration menu.</td>
</tr>
<tr>
<td></td>
<td>Printing bed adhesion treatment is worn out or needs improvement.</td>
<td>Treat printing bed following the instructions provided in this manual.</td>
</tr>
<tr>
<td></td>
<td>Printing bed is not warm enough for the material.</td>
<td>Check recommended printing bed temperature for the chosen material type.</td>
</tr>
<tr>
<td></td>
<td>Printing chamber is too cool for the material.</td>
<td>Check recommended printing chamber temperature for the chosen material type.</td>
</tr>
<tr>
<td>Printing material extrusion is interrupted during printing.</td>
<td>Nozzle is too close to the printing bed when printing.</td>
<td>Perform height calibration for the nozzles.</td>
</tr>
<tr>
<td></td>
<td>Nozzle is too cool for the material.</td>
<td>Check recommended printing temperature for the chosen material.</td>
</tr>
<tr>
<td></td>
<td>Temporary malfunction in feeding.</td>
<td>Reset the printer and try again.</td>
</tr>
<tr>
<td>Issue</td>
<td>Possible Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Nozzle is clogged or extrusion is blocked by a foreign object.</td>
<td></td>
<td>Manually heat nozzle up to 350 degrees Celsius max. and extrude printing material through the nozzle. Replace nozzle.</td>
</tr>
<tr>
<td>Object layers do not stick to each other properly or not at all.</td>
<td>Nozzle temperature is too low.</td>
<td>Raise nozzle temperature for example 5 degrees Celsius over the recommendation. Decrease fan value from chamber fan hot/cold settings. Decrease printing speed.</td>
</tr>
<tr>
<td></td>
<td>Printing chamber temperature is too low.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Printing speed is too high.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Object walls are too thin.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nozzle height calibration was unsuccessful.</td>
<td></td>
</tr>
<tr>
<td>Printing pauses and continues in abnormal way.</td>
<td>File reading from USB flash drive is not working properly. Device memory is full. Computer causes the problems. (Printing using USB cable.)</td>
<td>Restart the printer and remove unnecessary files from the USB flash drive. Restart the printer. Run computer updates/Change computer.</td>
</tr>
<tr>
<td>Printing process stops before completion.</td>
<td>Power failure.</td>
<td>Restart the print. Re-create the G-Code and save the file to your computer first. (page 15) Restart the print. Ensure that the computer will not go to standby mode.</td>
</tr>
<tr>
<td></td>
<td>G-Code file on the USB flash drive is not complete.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Computer is in standby mode/restarted.</td>
<td></td>
</tr>
</tbody>
</table>
## 11.1 MINIFACTORY INNOVATOR
- Dimensions: 53x56x67cm
- Weight: 45kg
- Warranty: 12kk
- CE marking: Yes

## 11.2 3D PRINTING
- Number of extruders: 2
- Printing materials: PLA, ABS, Nylon, PVA, Carbon fiber(PLA), Polycarbonate among other things.
- Printing dimensions: 330x260x310mm, 11.8x10.2x11.8in
- Resolution: 0.02-0.40mm (20 - 400 microns)
- Shell thickness: minimum 0.4mm, optimal 1.2mm
- Printing material diameter: 1.75mm
- Nozzle diameter: 0.4mm
- Operation accuracy(X/Y): 0.01mm
- Operation accuracy(Z): 0.02mm
- *Object measurement accuracy: +0.2mm
- Printing operation speed: 60mm/s

## 11.3 TEMPERATURES
- Extruder temperature: max. 390°C
- Heated bed: Yes
- Bed temperature: 125°C
- Heated printing chamber: Yes, passive
- Printing chamber temperature: max. 55°C
- Ambient temperature: 15-35°C
- Storage temperature: 10-30°C

## 11.4 3D PRINTING PROCESS
- Air filter: Yes, Activated carbon filter + HEPA
- Support material: Soluble material available
- Standalone printing: USB drive
- Connection to 3D printer: USB cable

## 11.5 SOFTWARE AND ELECTRONICS
- Printing software: Repetier-host, Simplify 3D (for a fee)
- File types: .STL, .obj, .amf
- Operating system: Windows 7, 8, 10
- AC Input: 100Vac~260Vac <9A 50/60Hz
- DC Output: 24V DC @ 25A (600W)
- Power consumption: Normal use 150-350W, 600W at maximum capacity
## 12. WARRANTY CLAUSES

### 12.1 WARRANTY TERMS AND CONDITIONS

miniFactory warrants that during the warranty period the Product will with normal use and service be free from faulty parts, manufacture or workmanship.

This clause relates to goods supplied in European Union (EU), and in European Economic Area (EEA). You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

You have rights and benefits under the consumer laws in your jurisdiction. Without detracting from these rights or benefits, miniFactory excludes all liability in respect of the Product for any other loss which is not reasonably foreseeable from a failure of this Product, which may include liability for negligence, loss of printed object, loss of expenditure associated with the Product and loss of enjoyment.

The warranty covers the following miniFactory components with following periods:

### 12.2 WARRANTY COVERS FOLLOWING PARTS (12 MONTHS)

- Servo/Stepper motors
- Electronic boards (Main board, Ext-board, Limit switch-board, Heating element)
- Extruder NTC thermistor
- Extruder heater cartridge 24V 35W
- Power Supply
- Bearings and shafts
- Sheet metal components

### 12.3 CONSUMABLE PARTS (WARRANTY DOES NOT COVER):

- Drive gear
- Extruder nozzle
- Build surface
- Printing filaments
- and others which are not listed in “warranty covers following parts” -list

This warranty is valid only for Products that are purchased new and unused in EU or EEA and are sourced from miniFactory Oy Ltd or its distribution channel. miniFactory distribution channel refers to its network of authorised distributors, dealer and retailers.

The customer must provide the original proof of purchase to receive any services under this warranty.

This warranty only applies where a defect has arisen, wholly or substantially, as a result of faulty manufacture, parts or workmanship during the Warranty Period.

The warranty does not apply where damage is caused by other factors, including without limitation:

(a) normal wear and tear; (b) abuse, mishandling, accident or failure to follow operating instructions; (c) exposure to liquid or infiltration of foreign particles; (e) servicing or modification of the Product other than by miniFactory, or their authorised service agents; (f) use of the Product with unsuitable printing materials;
(g) use of the Product with other accessories, attachments, product supplies, parts or devices that do not conform to miniFactory specifications; or (h) shipment or other transit.

This warranty does not cover:

a) Replacement of any consumables, such as nozzles, filament cartridges b) software included with printers c) miniFactory compatibility with computer

12.4 MAKING A WARRANTY CLAIM

You must inform miniFactory as soon as the warranty claim arises

You must provide miniFactory your original proof of purchase and a written description of the fault (including image samples and any other relevant material if and when requested)

12.5 WARRANTY PERIOD

Warranty period is one (1) year counting from the day when the product has been shipped from miniFactory warehouse.

Replacement parts or any other things does not refresh the warranty period.

12.6 CONTACT INFORMATION

Address:
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Huhtalantie 2
60220 Seinäjoki Finland, Europe
VAT: FI25182357
E-mail: info@minifactory.fi