



**SMART MOTOR DEVICES**

<http://smd.ee>

## **3D printer Skyone**

**User manual**

**2017 December**



## Safety precautions

- Keep the printer out of magnetic and electric field exposure.
- Electric equipment repair shall be provided only by professionals in an authorized service center. Any inappropriately implemented repair could lead to reducing the equipment lifetime.

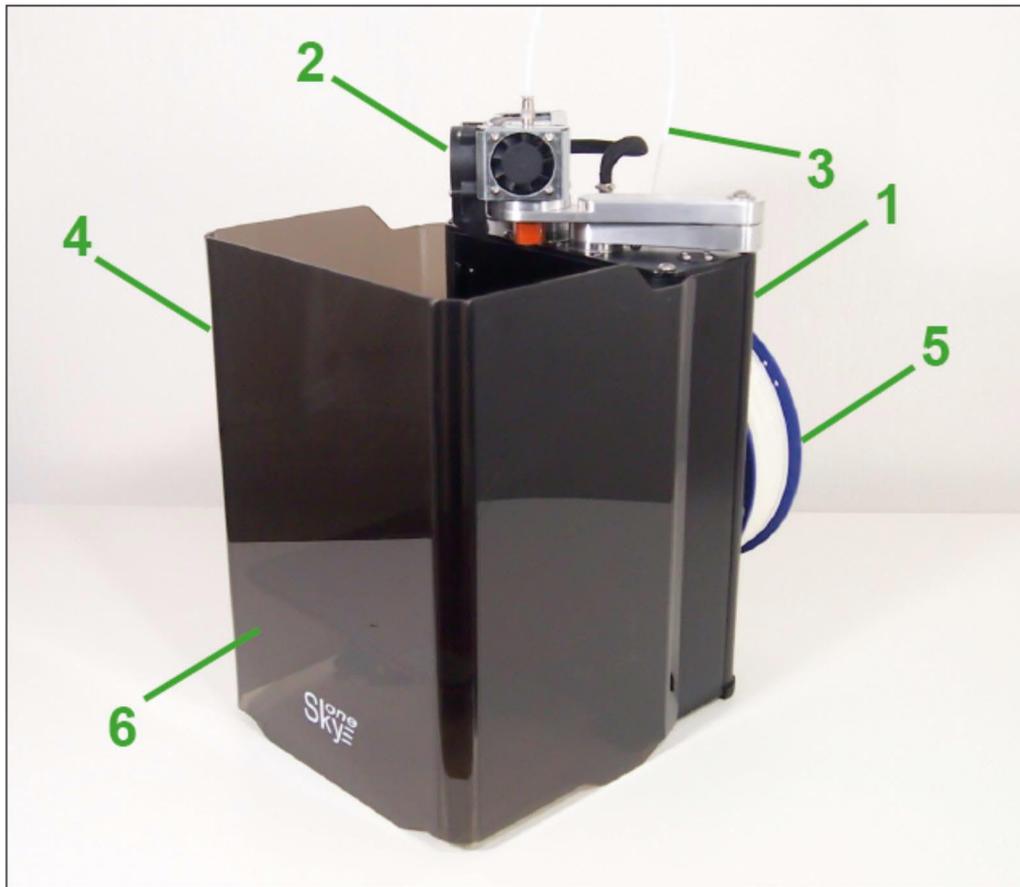
It is strongly recommended to read and understand operating rules before using the 3D printer.

### Attention:

- The printer must be set at a flat stable surface.
- Sky One installation site should be located at a dry light place.
- It is not allowed to use the printer in dusty or moist environments.
- The printing nozzle of the printer and the heated platform heat up to high temperature. To avoid burning do not touch them while the printer is working. After the printer has finished printing wait at least 5-7 minutes in order to let them get cold.
- There are moving parts in the printer. Please avoid foreign objects of getting into the actuating mechanisms of the printer while it is working. It may cause injuries and damage the equipment.
- As the equipment operates using the technology of fused deposition modeling, it is possible that characteristic smell of plastic will occur during the printing process. It is a technological feature of the equipment.
- Printer electronics are sensitive to voltage surges and variations. It is strongly recommended to assure the stability of the power supply source. If there is no such source available, please get one.
- Usage of low quality and unapproved consumable materials may impact printed object quality and may adversely affect or damage the feeding system of the 3D printer.
- In the event of a malfunction or operating failures turn the printer off and contact the service center.
- It is prohibited to place foreign objects on to the printer.
- Children admission to the printer during operating process without adult supervision is prohibited.



## Description of the 3D printer



1 – Case

3 – Filament feeder tube

5 – Spool of filament

2 – Extruder

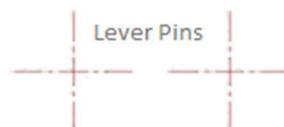
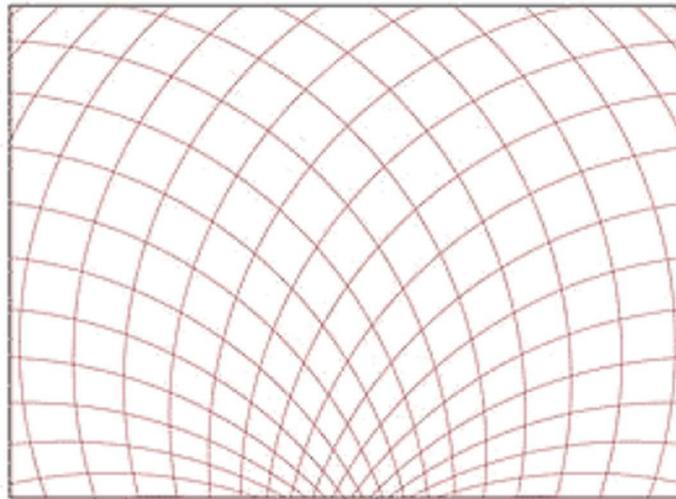
4 - Organic glass protection screen

6 – Table



## Technical characteristics

- Printing technology FDM (Fused Deposition Modeling).
- Max power draw 300W.
- Print area 140x200x200mm.
- Displacement limits 150x210x210mm.
- Layer Thickness from 0.1mm.
- Filament diameter from 1.75mm.
- Nozzle diameter 0.4mm (optionally from 0.3mm to 1mm can be chosed).
- Extruder maximum temperature 260°C.
- Table maximum temperature 110°C.
- Control software Repetier-Host.
- Supported 3D models file formats STL, OB, Simplify 3D.
- Table incremental step along axis Z 0.0075mm.
- Angle step of operating mechanism of the SCARA system is 0.0450 degree or 0°2'42", reduction gradient at working surface X-Y axes is given below in the figure.





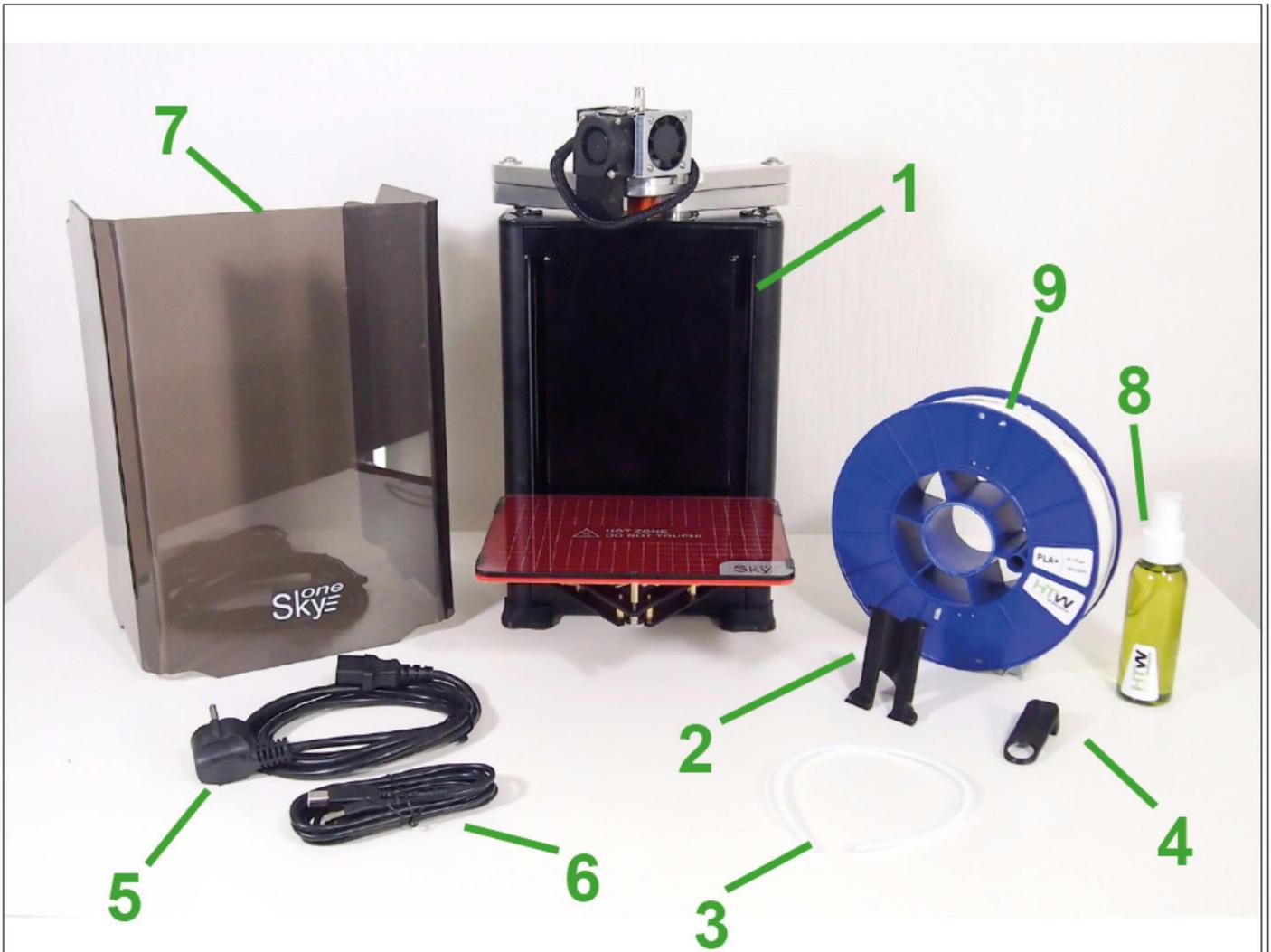
## Package Contents

- Coordinate machine SkyOne 1 pcs
- A heated platform with glass surface 1 pcs
- Direct extruder with nozzle diameter 0.4mm 1 pcs
- Organic glass protection screen 1 pcs
- A spool of PLA filament 1 pcs
- Spray for better adhesion of the work surface 1 pcs
- A power cable 1 pcs
- USB A-B cable 1 pcs
- User manual 1 pcs



## Preparation to work

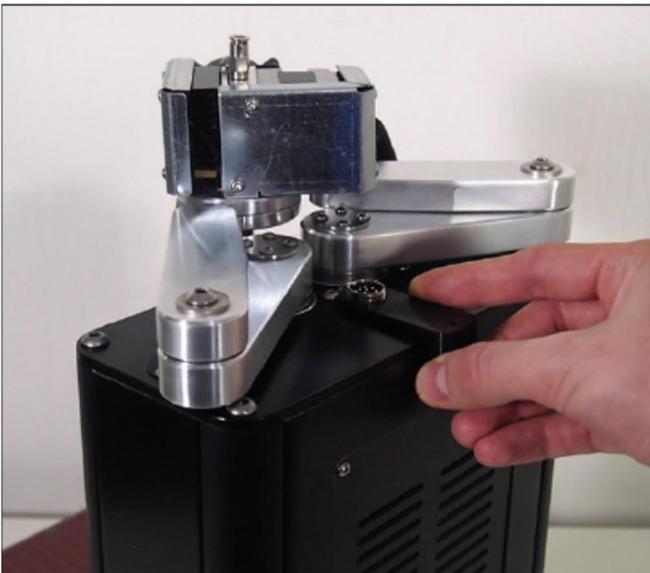
### 1. Unpack the printer and components kit from the package



- 1 – 3D printer SkyOne
- 2 – Holder for fixing the spool
- 3 – Filament feeder tube
- 4 – Feeder tube holder
- 5 – Power cable
- 6 – USB cable
- 7 – Protective screen
- 8 – Spray for better adhesion
- 9 – Spool of PLA filament



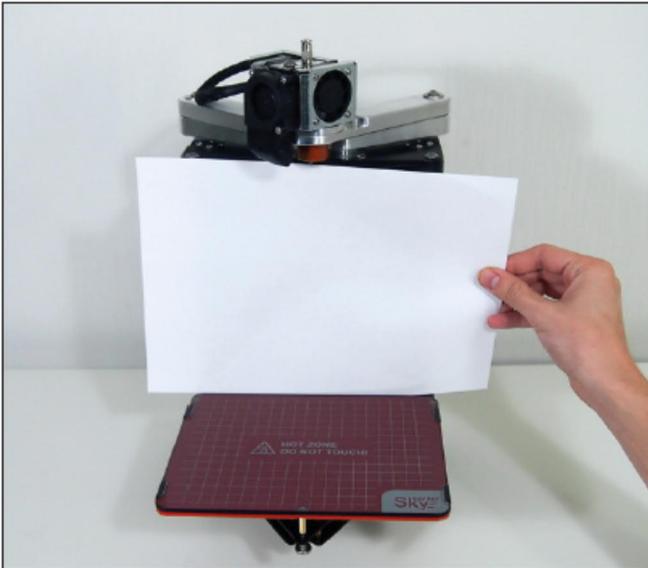
## 2. Attach the holder for the filament feeder tube



## 3. Plug in the extruder connector



Spray the adhesion lack evenly on the printing platform. If you do not remove the table from the printer, use a sheet of paper to protect the printer from the spray.



**Note:**

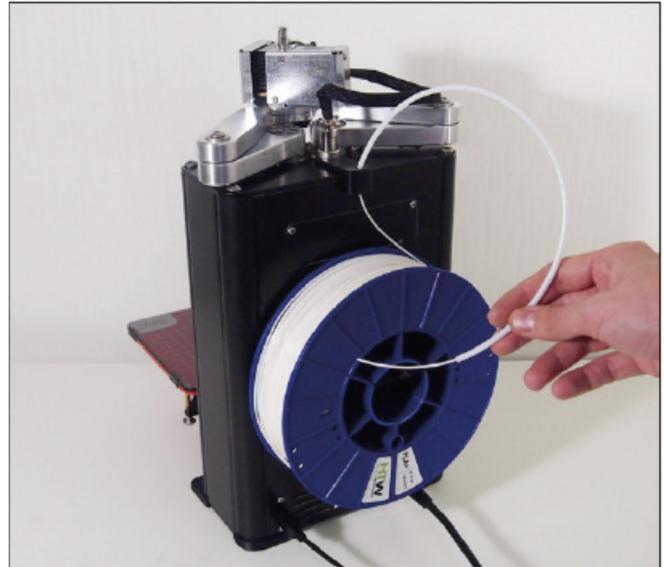
To remove the table from the printer, please, undo 4 knurled bolts from the bottom of the printing plate and pull.

**4. Connect the power cable and USB cable**





## 5. Attach the holder and put on it the spool with plastic.



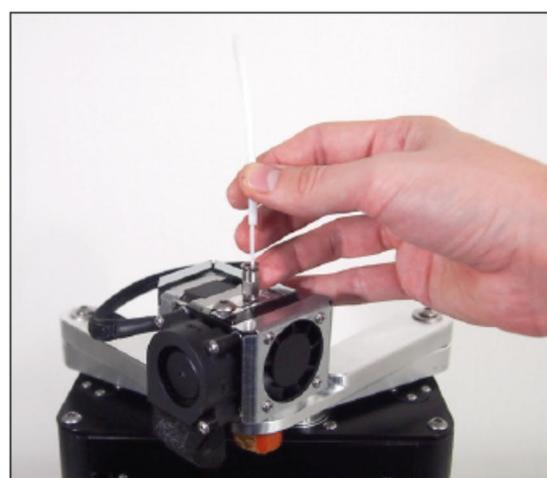
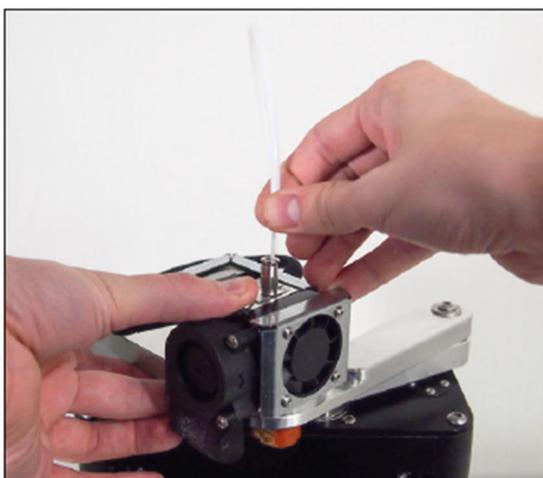
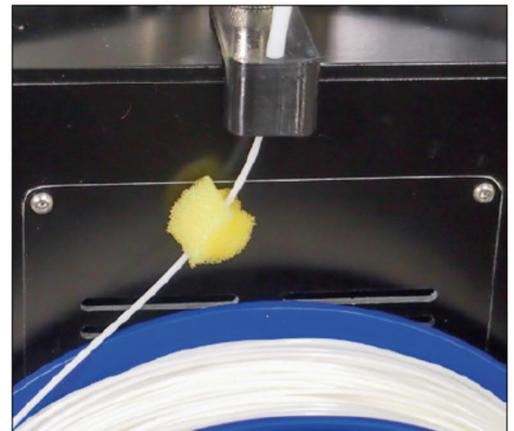
## 6. Filament loading

Feed the end of the plastic filament through the feeder tube holder and the guide tube so that it appears about 10cm out the other side.

### Note:

To extend the extruder and nozzle lifetime it is recommended to run the plastic filament through a piece of polyurethane foam soaked in paraffinic or silicon oil.

Push the jutting out M6 bolt and insert the plastic thread about 8 cm into the hole.





Insert the guide tube into the collet fixture till locking.

## 7. Install the protective screen



3D printer SkyOne without protective screen

### Note:

The protective screen is necessary to avoid influences of foreign air flows, (i.e. from an open window) on printing process when using plastics with large thermal-expansion coefficients.

### **Attention:**

To avoid overturning the printer do not place any objects under the moving platform.



3D printer SkyOne with protective screen



## Software installation

When the connected to a computer printer is switched on, installation of electronic chip FTDI driver will be launched. The installation will take up to several minutes. If the driver installation is not launched automatically, download the driver from the website [www.ftdichip.com/Drivers/VCP.htm](http://www.ftdichip.com/Drivers/VCP.htm) and install it manually.

Install the software Repetier-Host. Please, download the installation pack from the website [www.repetier.com/download-now](http://www.repetier.com/download-now).

3D printer SkyOne is tested on the software Repetier-Host. We do not guaranty stable work in case of usage of another software.

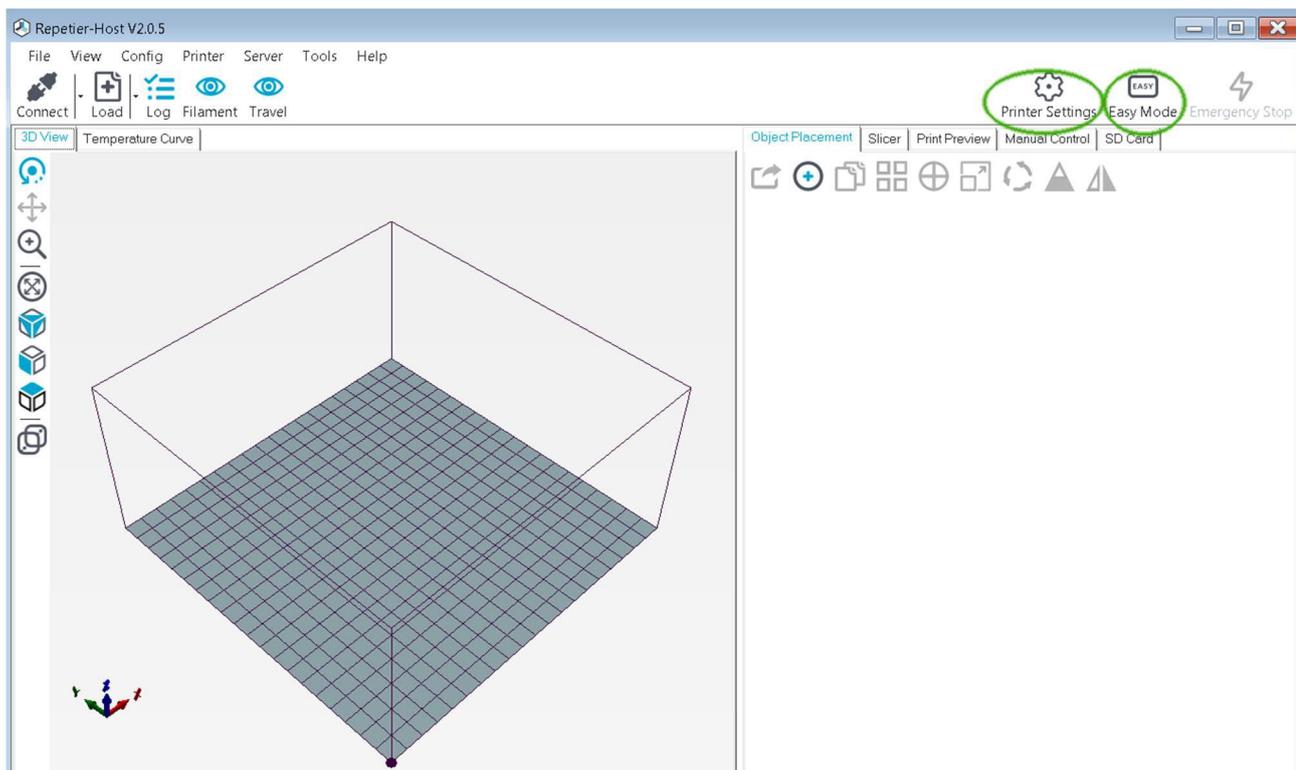
### Note:

The Windows user name should be spelt out in the Latin alphabet. If necessary, create additional profile in the system.

## Adjustment of Repetier-Host

After installing the software it is necessary to adjust connection parameters and printer mechanical parameters. The printer should be assembled, connected to the computer with an USB cable, the electronic chip FTDI driver should be installed by this time.

Launch Repetier-Host software, deactivate mode "Easy mode" by clicking the button at the right top corner (indication icon should blink off) and enter the printer settings (please, see the picture below).





Printer Settings

Printer: default

Connection | Printer | Extruder | Printer Shape | Scripts | Advanced

Connector: Serial Connection Help

**Notice: You have a Repetier-Server installation. We highly recommend using the Repetier-Server connector instead. Click "Help" for more informations.**

Port: Auto

Baud Rate: 250000

Transfer Protocol: Autodetect

Reset on Emergency: Send emergency command and reconnect

Receive Cache Size:

Communication Timeout:  [s]

Use Ping-Pong Communication (Send only after ok)

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.

OK Apply Cancel

In the "connection" tab set the next parameters:

Connection – Serial connection (connection type);

Port – COM (printer SkyOne connection port number). The relevant SkyOne connection port number is detected automatically when choose "Auto" option. But this function is not always working correctly. So it is better to choose the exact port number;

Baud rate – 250000;

Transfer protocol – Autodetect;

Reset on Emergency – Send emergency command and reconnect;

Receive Cash Size – 127;

Communication Timeout – 80.



Check box “Use Ping-Pong Communication (Send only after ok)” should be checked.

Also as a matter of convenience we recommend to give the name of the configuration in the “printer” field at the top corner of the parameters screen.

Go to tab Printer and set parameters according with the picture below.

Printer Settings

Printer: SkyOne

Connection | **Printer** | Extruder | Printer Shape | Scripts | Advanced

Firmware Type: Autodetect

Travel Feed Rate: 10800 [mm/min]

Z-Axis Feed Rate: 600 [mm/min]

Manual Extrusion Speed: 2 [mm/s] 20 [mm/s]

Manual Retraction Speed: 30 [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. [Slider]

Park Position: X: 0 Y: 0 Z min: 0 [mm]

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

Add to comp. Printing Time 8 [%]

Invert Direction in Controls for  X-Axis  Y-Axis  Z-Axis  Flip X and Y

OK Apply Cancel



Go to tab Extruder and set parameters according with the picture below.

Printer Settings

Printer: SkyOne

Connection | Printer | **Extruder** | Printer Shape | Scripts | Advanced

Number of Extruder: 1

Number of Fans: 1

Max. Extruder Temperature: 260

Max. Bed Temperature: 120

Max. Volume per second: 12 [mm<sup>3</sup>/s]

Printer has a Mixing Extruder (one nozzle for all colors)

Extruder 1

Name:

Diameter: 0.4 [mm] Temperature Offset: 0 [°C]

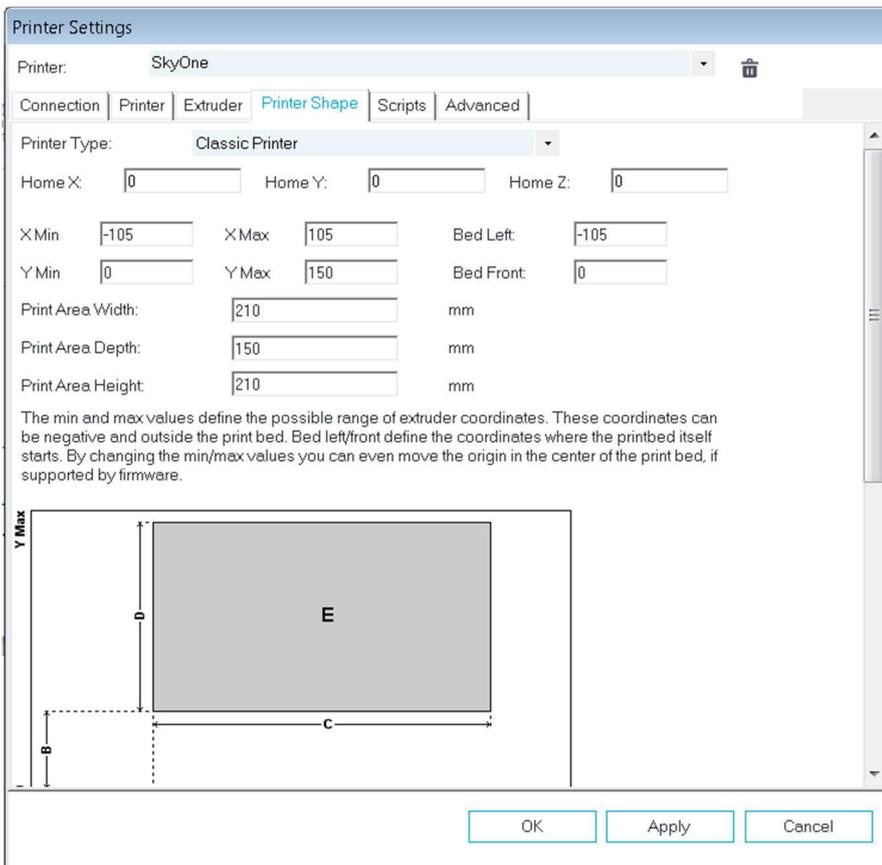
Color: ████████

Offset X: 0 Offset Y: 0 [mm]

OK Apply Cancel

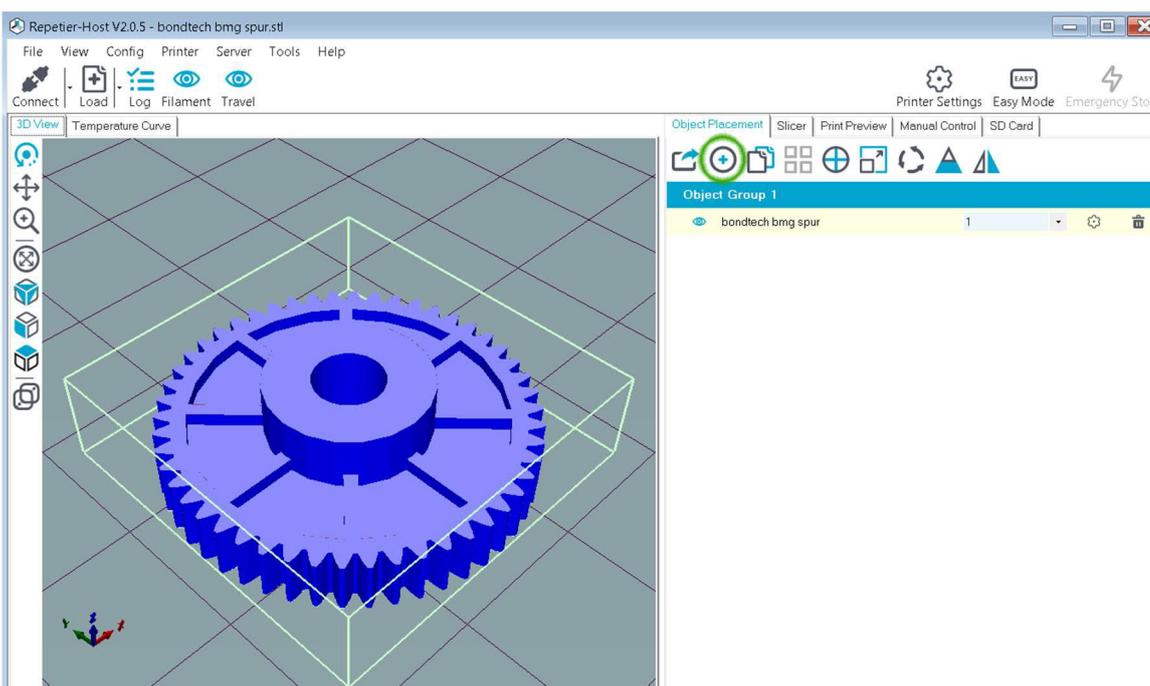


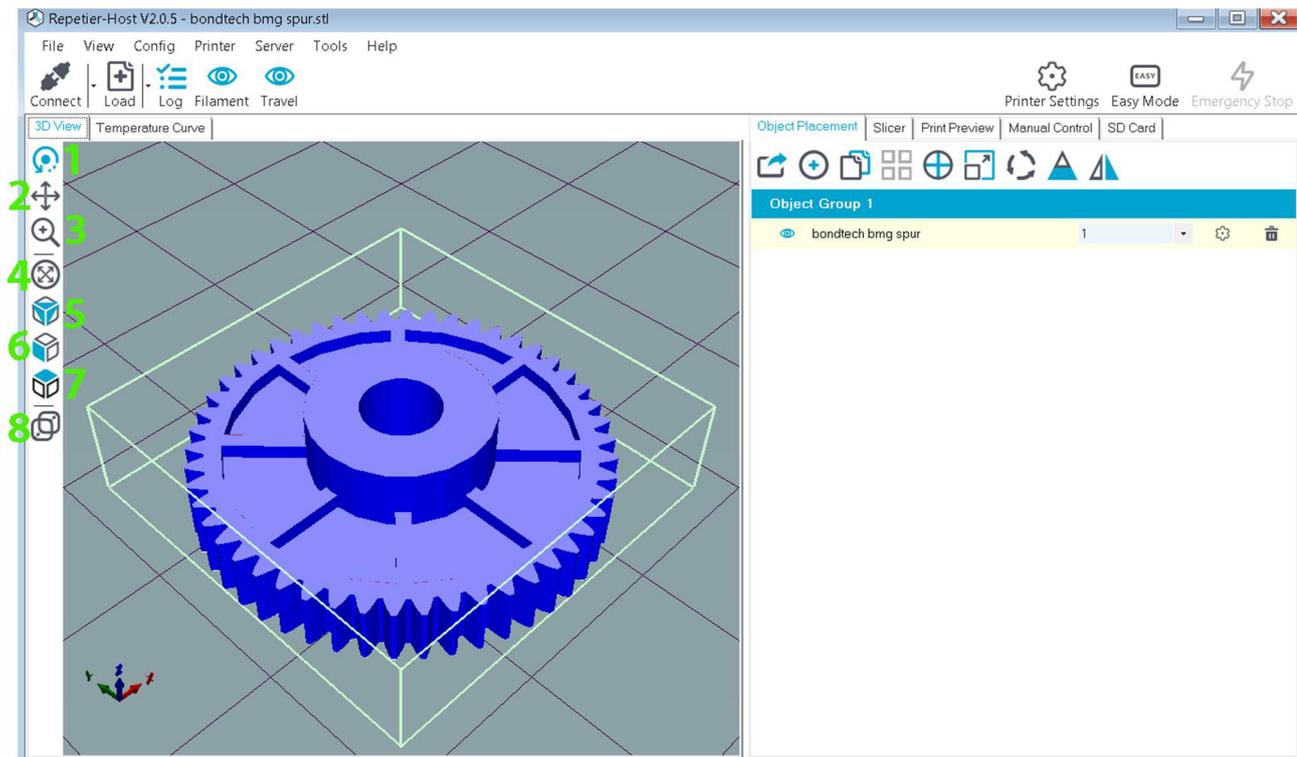
Go to tab Printer Shape and set parameters according with the picture below.



After setting all parameters push “Apply” button to apply these changes and close the Printer Settings window.

On the tab Object Placement push the button “Add object”. Choose a file \*.stl, \*.obj, \*.3ds or \*.gcode.





It will appear in a work space in the tab 3D View. There are navigation buttons in the left side of the window.

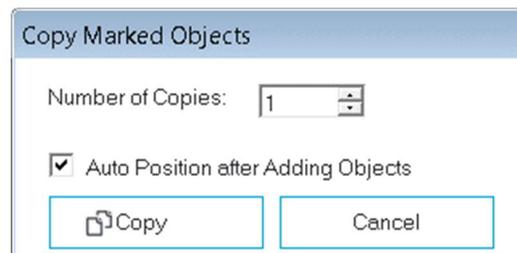
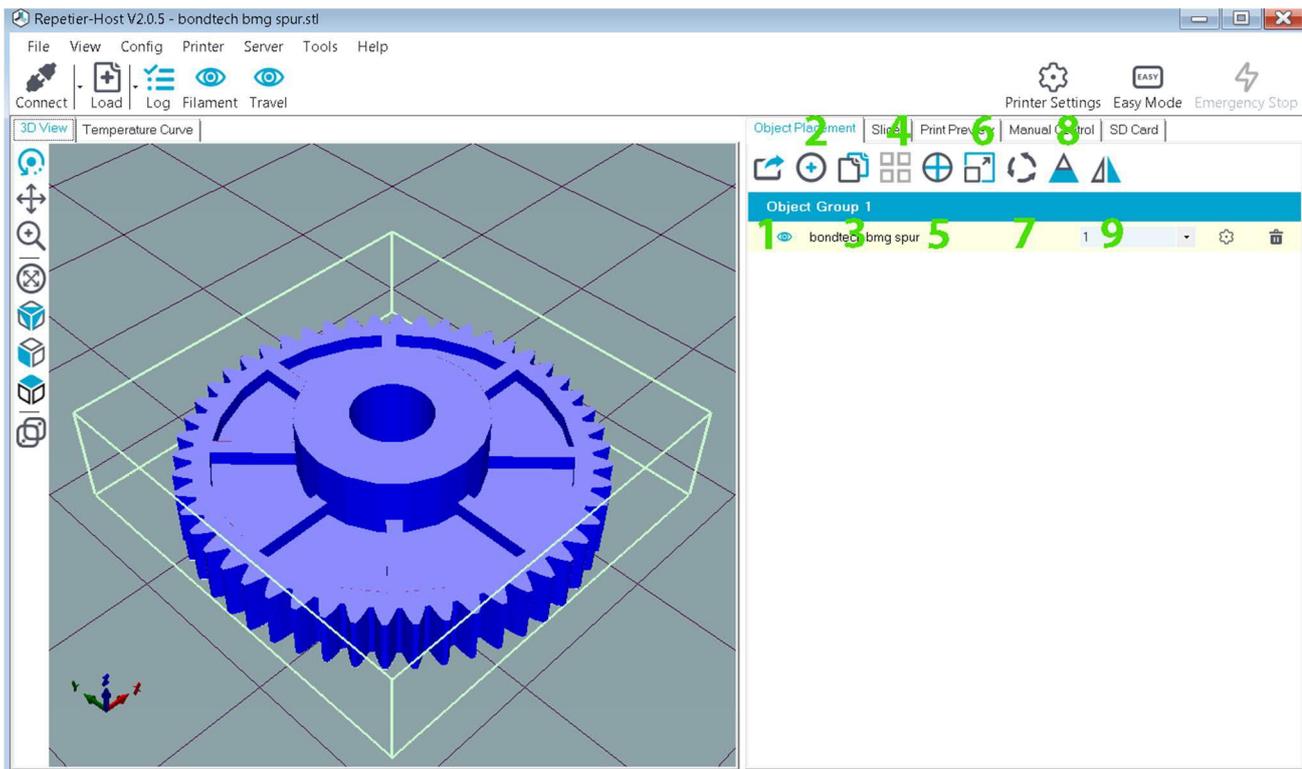
The first four buttons change the function of the left mouse button:

1. "Rotation"
2. Object movement
3. Zooming
4. Zoom object to fit

The next three buttons are used for orientation of a view point.

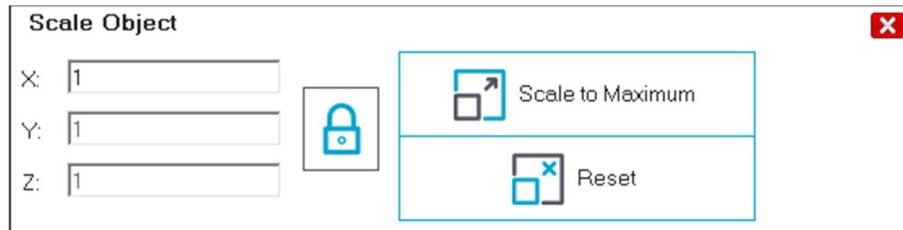
5. Isometric view
6. Front view
7. Top view
8. The last eight button turns on/turns off displaying workspace in perspective view.

There is an extended list of view options in a menu View in the top side of the window.



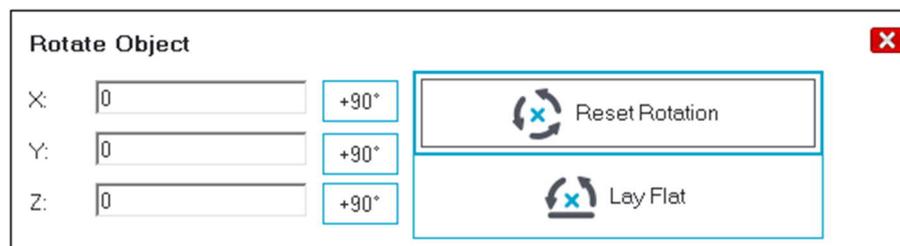
A list of loaded objects and control buttons for work with objects are located on the right side of the workspace window:

1. Export all displayed objects at once as one file, creation of ready moulds.
2. Add objects to the workspace (stl, .obj, .amf and .3ds).
3. Duplicate the marked objects. Duplicating parameters could be adjusted in the appeared dialog window.
4. Automatic place objects on the bed.
5. Center object in the center of the bed.
6. Proportionally scale objects in all directions all at once. The unlock button is used for setting of different scaling factors. A click on "Scale to Maximum" enlarges the model so that it fills all the workspace. The Reset button is used for cancelling of all model changes.



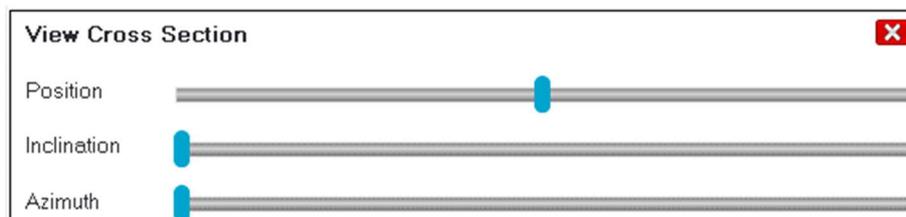
## 7. Rotate object.

This option allows rotating the object about each of the axes. The button Lay Flat aligns the model over the bed. The Reset button cancels all the model changes.



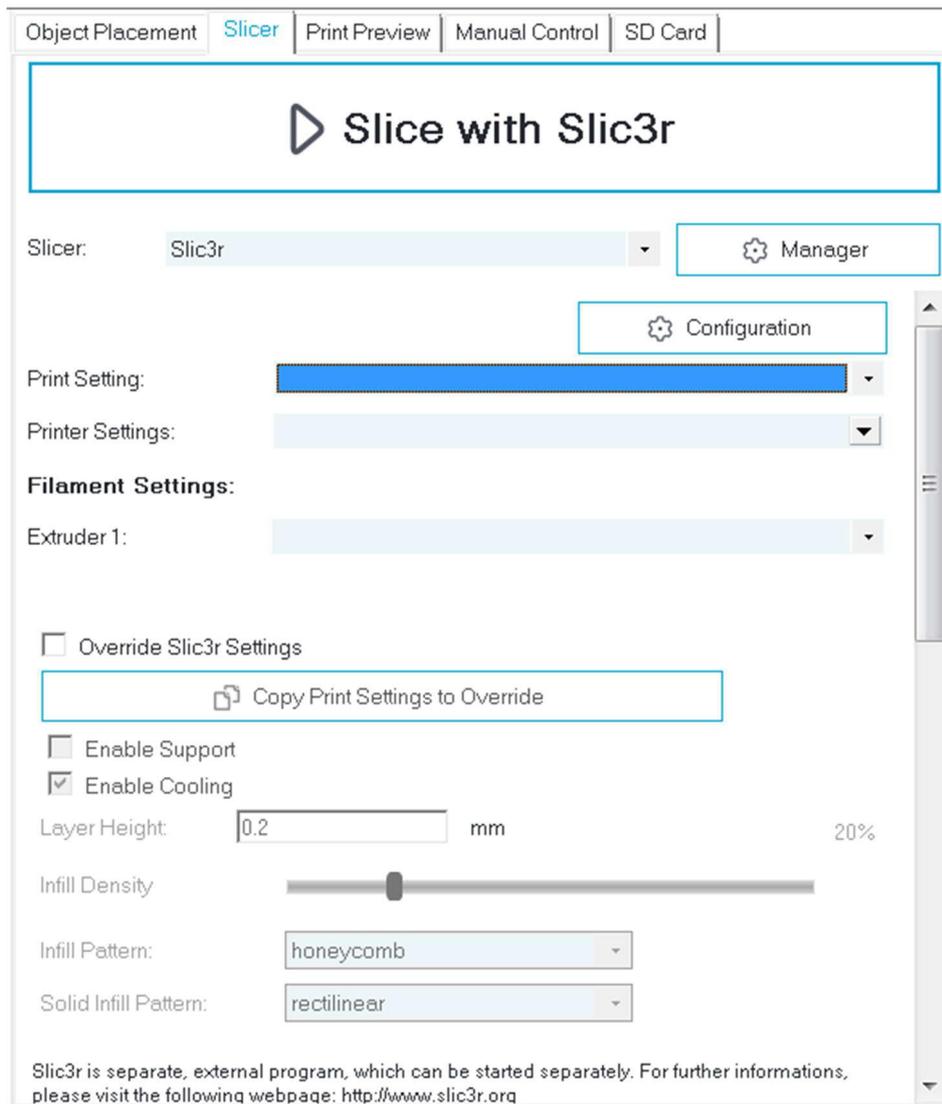
## 8. Cross section.

This option is used to control cuts of objects and does not influence on the print. Slider boxes in the dialog window are intended for defining rotation of the cutting plane.



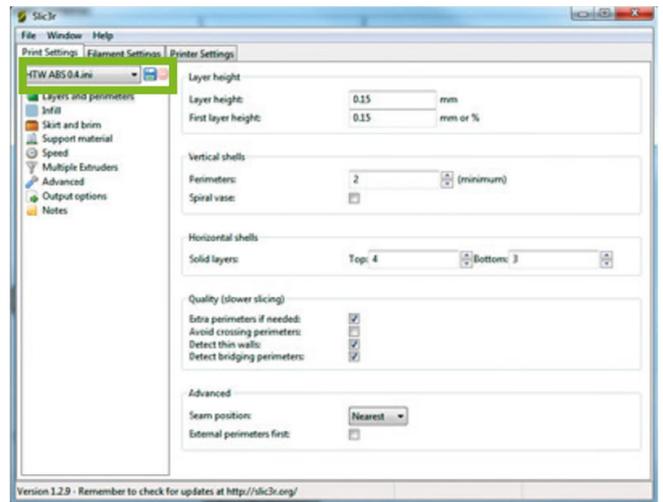
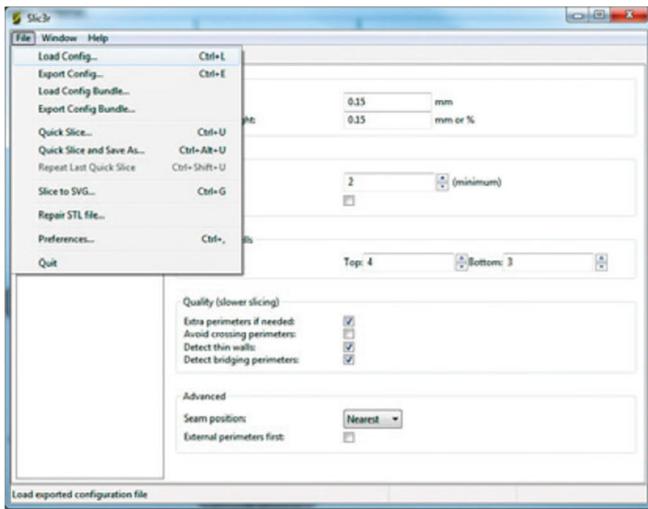
## 9. Mirror object.

This option should be used carefully as sometimes during mirroring normal lines are formed incorrectly.



Open the tab Slicer. It is a software component for transformation of digital mathematical model to an instruction for the 3D printer. It is recommended to use a slicer Slic3r for the 3D printer SkyOne.

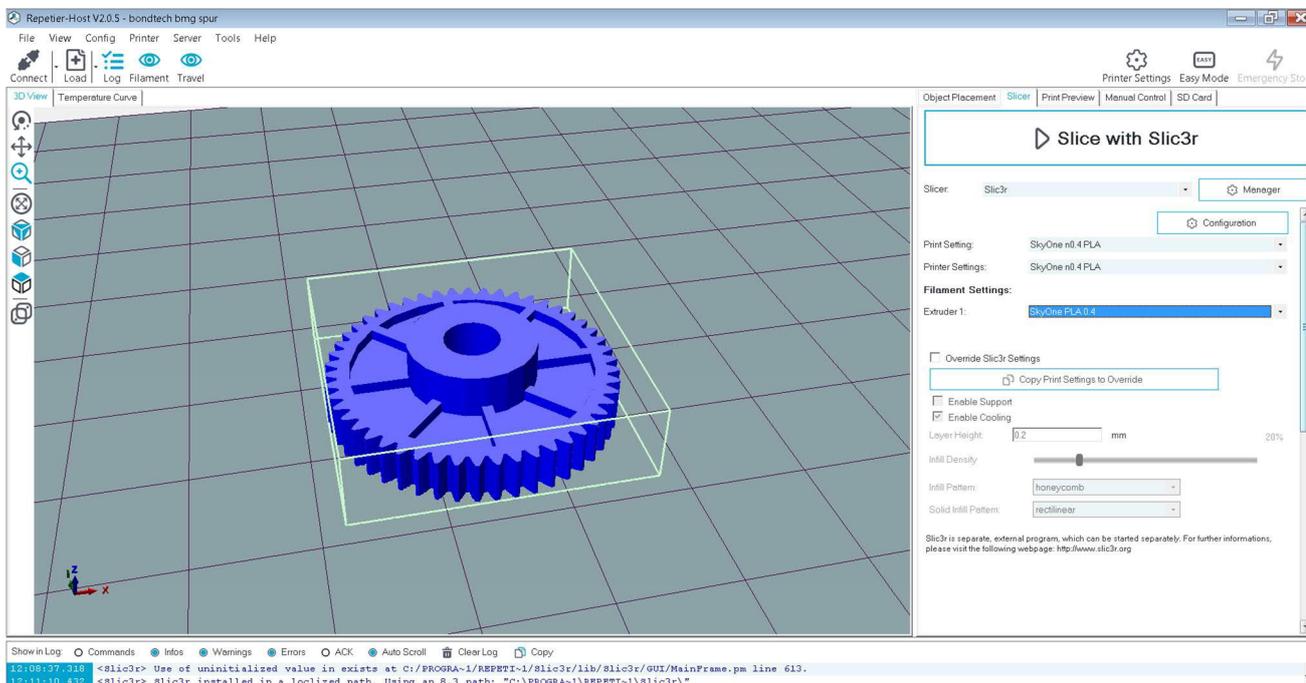
Slic3r has its own host – interface. To start working with Slic3r and configure it in the needed way press the button “Configuration”. It is possible to create an unlimited number of templates before adjusting of printing modes. We recommend to give them meaning-bearing names, which would contain key information of the template (layer height, speed, material and ext.). To make using our plastics easier, we prepared ready templates, which could be loaded in the following way: while staying in the “Configuration” window choose the option “File” – “Load Config Bundle” in the top menu, in the dialog window choose the configuration file.



After that the chosen configuration will appear in the window. The name of the configuration is the same as the file name (marked with the green color on the picture).

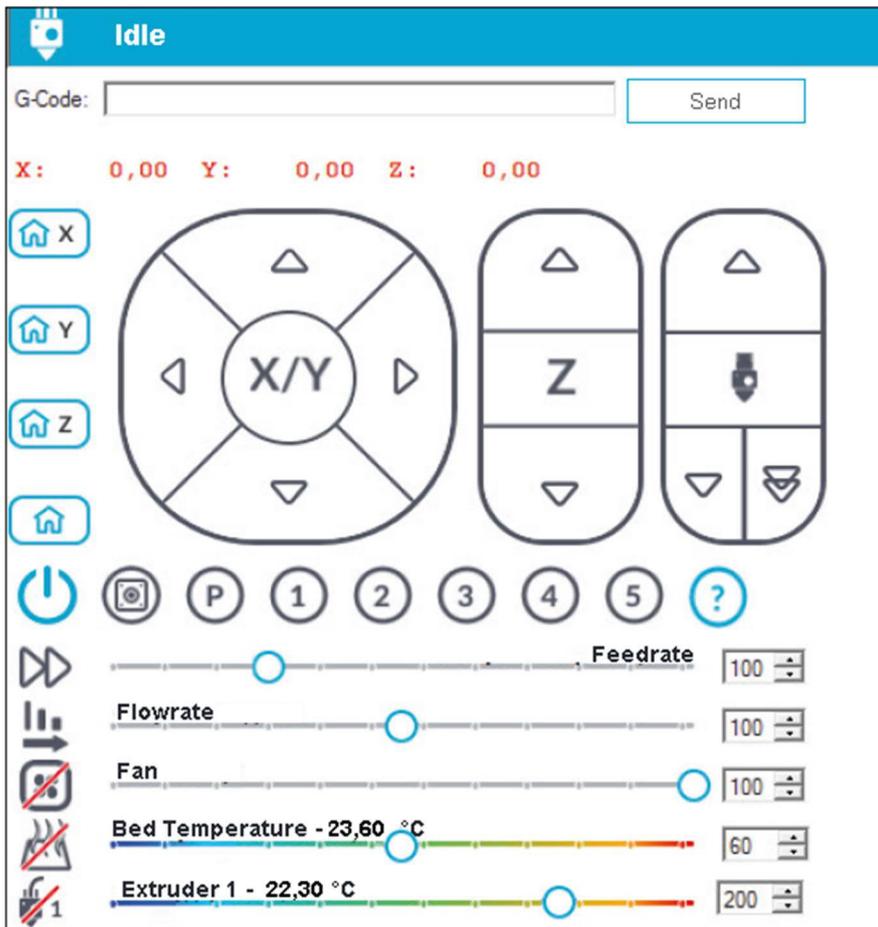
To save the configuration it is needed to open tabs “Print Settings”, “Filament Settings”, “Printer Settings” and press “Save” icon at each tab.

Close the configuration window and turn back to the tab “Slicer” and choose in dropdown lists “Print Settings”, “Printer Settings” and “Extruder 1” the loaded configuration, which is suitable for used plastic and diameter of the installed nozzle.



There is a convenient feature of the Slic3r interface – it is setting “Reboot of setting Slic3r”. Due to this feature it is possible to change some parameters without entering “Configuration” window.

The next tab is “Print Preview”. In this tab print statistics and visualization of printing head displacement are available. And also it is possible to save ready G-code (executing program).



Next open the tab “Manual control”. There is the status bar on the top side. Under the status bar command line is located. Insert the G-code command and press “Send” button. If the option “Easy Mode” is active, this field becomes disabled. It is possible to list previously inserted commands by using of a scroll wheel.

The most frequently used G-commands for manual control are:

**G28** – go to home position

**G1 F2000 X10 Y50 Z30** – move printing head to coordinates x=10mm, y=50mm, z=30mm at a speed of 2000 mm/min.

**M84** – turn of stepper motors.

**M190 S60** – turn on the bed heating and wait till it heats up to 60 degrees.

**M109 S210** – turn on the nozzle and wait till it heats up to 210 degrees.

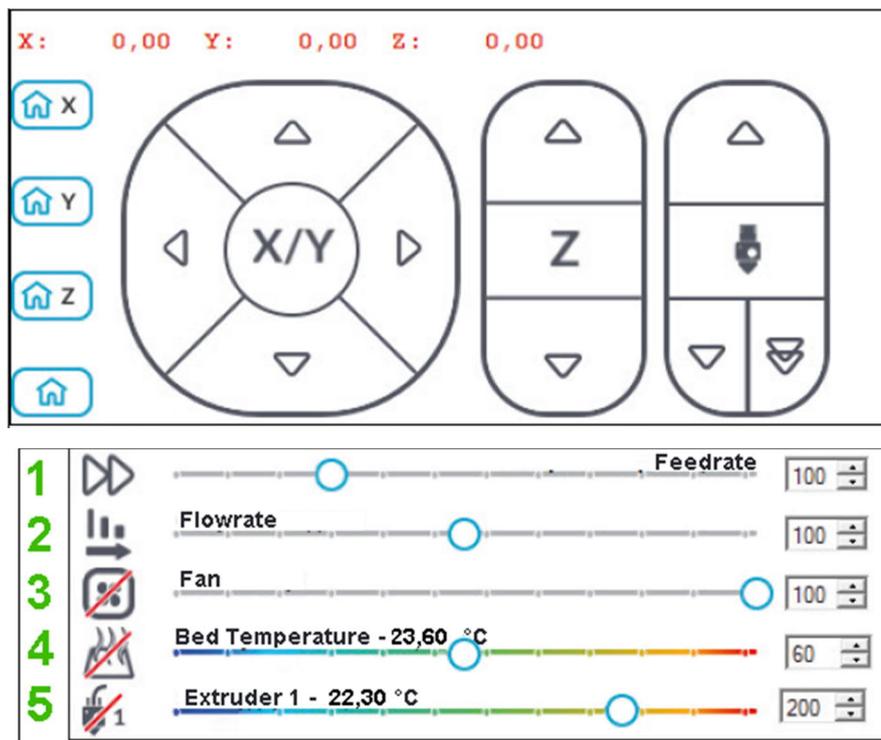
**M104 S0** – turn off the extruder heating.

**M140 S0** – turn off the bed heating.



# SMART MOTOR DEVICES

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The next block controls the printing head position relative to the work space. With the arrow keys the printing head is positioned along every of three axes.

At the top side of the window the current position of every axis is shown. Red color means that the host doesn't have information about the printing head real position. Press the home button to move the extruder to its defined position. After that the color turns black, it means the position is known.

Slider boxes for control of some parameters are located below. These parameters can be adjusted both before and in the process of printing.

1. The "Speed multiply" slider allows it to change the printing/move speed (the value is set as percentage in relation to the send feed rate).
2. Control the flow rate – the amount of the plastic filament feeding as percentage in relation to program set value.
3. Turn on and control the fan rotation speed.
4. Turn on the bed heating and choose its temperature.
5. Turn on the extruder heating and choose its temperature.



## The bed calibration

Before the first print it is needed to calibrate the bed and to align its plane relatively to the extruder motion plane. To change the position of the bed work surface 3 milled nuts are intended. One of them is located in the center of table edge, 2 others - at the corners of the table at the bottom.

To calibrate the bed connect to the printer using Repetier-Host (as described in previous sections), go to the Manual control tab and insert in the command line:

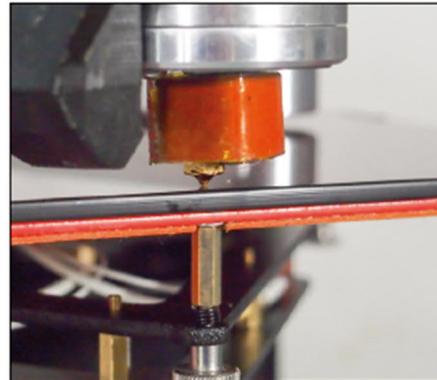
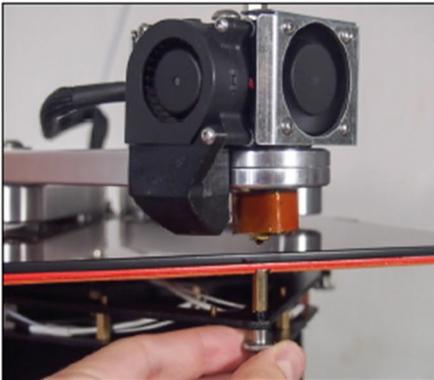
**M190 S60**

**M109 S210**

Turn on the heating of the bed and extruder. To send the commands press the button “Enter” after every of the command. Screw bed adjusting screws until tight. After the bed and extruder heat up, insert the next commands:

**G28**

**G1 Y145 Z0**



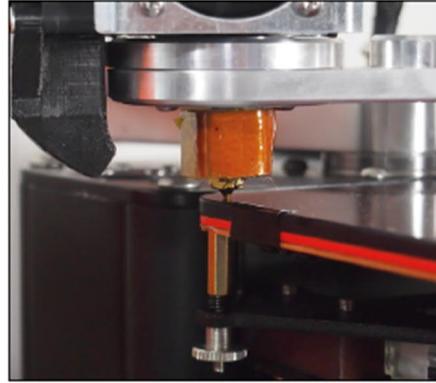
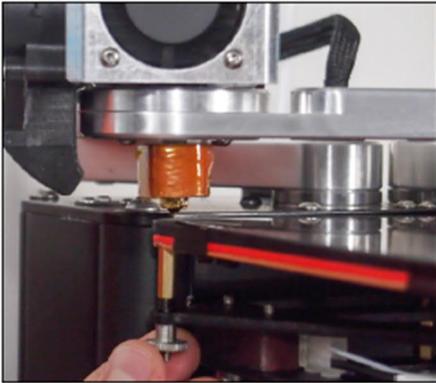
The printing head will move and take a position above the first adjusting screw. Turn the screw till the moment when the bed will touch slightly the end of the nozzle.

Then insert the commands:

**G28**

**G1 X100 Y0**

The printing head will take a position above the second adjusting screw. Repeat the same actions as with first screw.



The next commands block:

**G28**

**G1 X-100**

The printing head will move to the position above the third adjusting screw. Repeat the same actions as with first and second screws. After that move the printing head to the origin of the bed by the command **G1 X0 Y0 Z0**.

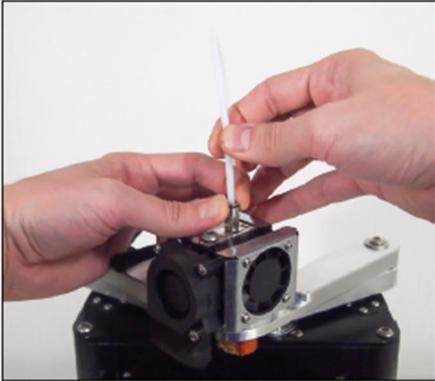
For the first adjustment it is recommended to repeat the above procedure 2 or 3 times.

Later, if the printer is not displaced and the table was not took off, such alignment should be repeated once a month.

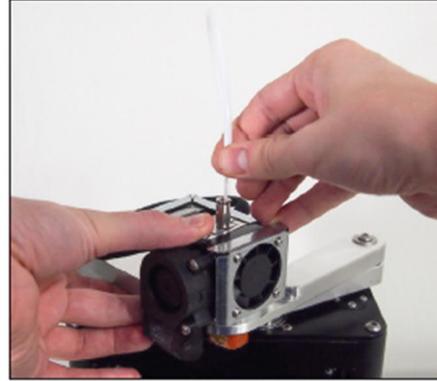


## Plastic replacement

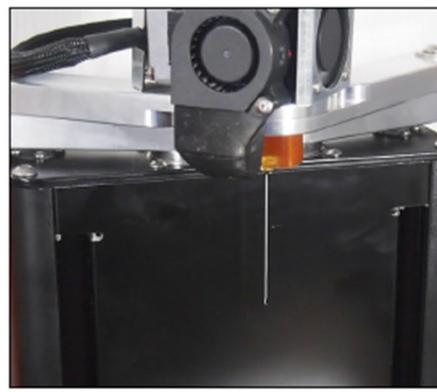
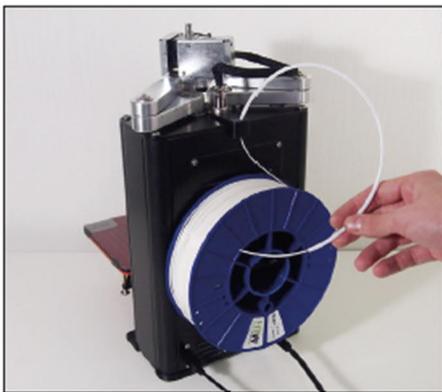
Before plastic replacement heat the extruder up to 180 degrees. After that execute the next:



1. Pressing the ring of the split terminal, take out the guide tube.



2. Pressing the M6 bolt head of the press lever, take out plastic.



Seat the spool with plastic and feed the end of the plastic filament through the feeder tube holder and the guide tube so that it appears about 10cm out the other side.

Push jutting out bolt M6 and insert the plastic thread about 8 cm into the hole. Insert the guide tube into the collet fixture till locking (refer to the section "Filament loading").

After that heat the extruder up to 220°C and slowly feed the plastic using a corresponding command till the plastic thread will appear at the output of the nozzle (refer to the photo above).



## First print

1. Import the model file to the program Repetier-Host.
2. Orient the model in the operating area in desired way.
3. Prepare the execute program using slicer.
4. Press the button “Connect”, wait while the printer get connected.
5. Press the button “Start” on the top panel to start printing.

After that the printer will automatically heat the bed up to a work temperature within a few minutes, and afterwards will move the extruder to the home position, lift up the working surface and after heating of the extruder start construction of the detail.