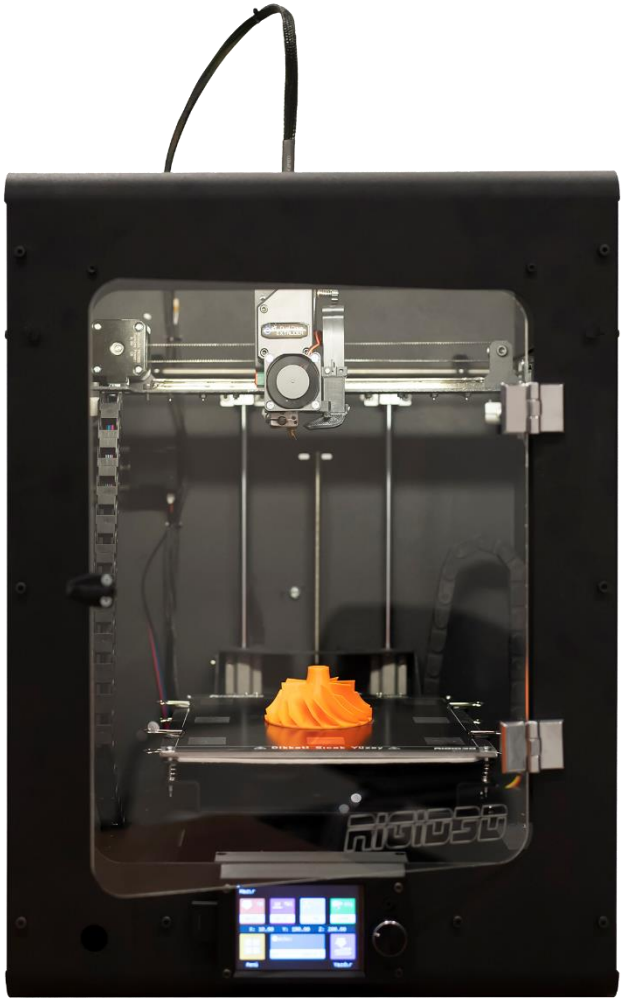
IMAGINE, DESIGN, PRODUCE

ZERO3

User guide

English

Version 1.0



DISCLAIMER

Please read and understand this manual before using your device.

Using the device without learning the manual content; may cause personal injury, environmental damage, or damage to your device. Always make sure that the person who will use the device has learned the information in the manual and can reach this manual when necessary.

Transportation, storage, installation, use and disposal of this device are not within the knowledge and control of the manufacturer. Therefore, the manufacturer is not responsible for any loss, injury, damage or expense that may be associated with the transportation, storage, installation, use and disposal of the device. The manufacturer shall not be liable for any direct, indirect or incidental and special damages, losses, costs or expenses arising from or related to the use of the information or products in this manual.

The content of this guide is for informational purposes only. The products mentioned in the manual are subject to change without notice in accordance with the manufacturer's continuous improvement program.

Every effort has been made to ensure that the information in this guide is accurate and complete. However, the accuracy of the information in the guide is not guaranteed, directly or indirectly.

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PURPOSE OF USAGE

Rigid3D 3D printers are designed and manufactured to produce models from PLA plastic using the heated filament fabrication technique in commercial and industrial environments. The device is suitable for conceptual models, functional prototypes and low-volume production. In order to obtain successful results in the manufacturing process, the user must determine and apply the correct production parameters according to the geometry of the model and the properties of the filament used. Although the device can work with brand-independent raw materials, it is recommended to use 3D printer filaments that are tested and approved by the manufacturer for best results.

CONTENTS

SAFETY

A.1. WARNINGS

Throughout this document, issues and warnings that pose a safety hazard are indicated with an exclamation point.

The device has moving and high-temperature parts that can cause injury. In order to avoid any injury, do not interfere with the print head and print platform of the device during and after printing until the device cools down.

Before servicing your device, make sure that your device is turned off and unplugged. Never interfere with the power supply of the device, even if the device is turned off and unplugged.

Keep the device under the supervision of the operator during the entire printing process. Never print with the device without operator supervision.

Do not modify or repair the device without the manufacturer's written approval.

Never open the bottom cover of the device. There are no user-serviceable components in this section.

The device is not suitable for use by persons (including children) with reduced physical or mental capabilities or lack of experience and knowledge without a supervisor to ensure their safety.

Children should be supervised when using the device.

Do not store anything inside the device.

Connect the device to a grounded socket only.

A.2. DANGERS AND RISKS

A.2.1. ELECTROMAGNETIC COMPATIBILITY (EMC)

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take precautions to prevent the interference.

A.2.2. MECHANICAL HAZARDS

The device contains many moving parts. However, stepper motors are not powerful enough to cause serious injuries. However, it is recommended to only manipulate the printing environment when the machine is turned off.

A.2.3. RISK OF BURNING

There is a potential risk of burns. The print head can be as hot as 300° C and the print bed up to 150° C. For this reason, the temperature of the print head and print bed should be checked on the device screen, and the print head or the print bed should not be interfered with unless the temperatures are below 35° C.

A.2.4. FIRE RISK

The FFF printing method involves the controlled flow of hot plastic through a moving nozzle . The occurrence of a number of undesirable situations in the production process with a movable hot nozzle contains the risk of fire.

If the model is separated from the printing surface due to the shrinkage that occurs in the plastic during printing, the plastic part separated from the printing surface may wrap around the hot nozzle and cover it, and a thick plastic ball may cover the surrounding of the nozzle that continues to flow plastic during a long print. As a result of this event, the plastic material covering the nozzle may ignite with the effect of long-term heat.

In another case, it may be experienced as a result of the nozzle part hitting the model, which is separated from the printing surface due to shrinkage, during a long print. In such a case, a part of the print head may break due to metal fatigue as a result of repeated impact and the nozzle heater or nozzle temperature sensor may get rid of its place. This may cause the device to incorrectly detect the temperature in the nozzle section and operate the nozzle heater according to incorrect signals. If the nozzle heater is in contact with the plastic model during this situation , the plastic may ignite with high temperatures.

In order to minimize these risks, some precautions have been taken in the design of the device. The connections in the nozzle part are fixed to the machine by screwing method. This creates a stronger connection than plug-in systems. By enabling the device to control a number of scenarios programmatically, the negative situation was detected as much as possible and the device stopped printing. These are:

- If the device does not detect the temperature sensor, it immediately turns off the heater. (MinTemp Error)
- If the device detects too high temperature, it immediately turns off the heater. (MaxTemp Error)
- When the device is in constant temperature mode, if the temperature value measured by the extruder temperature sensor drops by 5° C or more within 10 seconds, or if the temperature value measured by the bed sensor drops by 3° C or more within 60 seconds, the operation is stopped. (Thermal Problem)
- For the extruder if the temperature does not increase by 2° C or more within every 30 seconds in the heating period, for the print bed if the temperature does not increase by 2° C or more within every 60 seconds in the heating period, the process is stopped. (Heating Problem)

Although the fire risk inherent in the heated filament printing method was tried to be minimized during the design of the device, no measure is as effective as operator control.

The device must be kept under operator control throughout the entire printing process. No prints should be taken with the device without operator control.

A.2.5. HEALTH RISK

The device is designed for printing with PLA filaments. The use of other materials is at the user's own discretion.

When printing with ABS, low concentrations of Styrene vapor may be released. In some cases, this can cause headache, fatigue, dizziness, confusion, drowsiness, weakness, difficulty in concentrating, and a feeling of intoxication.

Therefore, good ventilation is required in the environment where the device is used and prolonged exposure should be avoided.

Printing with pure PLA is considered safe. However, it is still recommended to ventilate the environment well due to unknown vapors that may arise from the colorants in colored PLA.

INTRODUCTION

B.1. GETTING STARTED

This manual contains information that will allow you to use your 3D printer correctly for many years of trouble-free operation. You need to check various printing parameters and try different settings to get successful prints. For this reason, it is very important that you take the time to learn how to use your machine first.

This guide includes how to set up your 3D printer, prepare it for printing, how to use it, how to maintain it, and safety warnings. It is important that you read and understand the manual in order to get quality prints with your 3D printer and to prevent possible accidents and injuries. Make sure that the people who will use the device read and understand this manual carefully and that users can access this manual when necessary.

Every effort has been made to ensure that the information in this manual is accurate and complete. However, this does not guarantee that the manual contains all the information. Therefore, the guide should be viewed as a guide only. If you detect any errors or omissions in the content of the guide, please inform us. Thanks to the corrections to be made in the guide in line with your feedback, the guide will improve and our service quality will increase.

The pictures used throughout the manual are for illustrative purposes and may differ from your product.

For any problem that you cannot find a solution to in the guide, you can find solutions from the support pages at http://www.rigid3d.com or you can benefit from the experiences of other users on Rigid3D social media pages.

You are now a member of the Rigid3D community. Welcome.

B.2. HOW DOES IT WORK?

Rigid3D 3D printer produces solid three-dimensional objects by melting thermoplastic filaments. After the three-dimensional design files are translated into commands for Rigid3D on the computer, they are sent to the device via SD card or USB connection. Rigid3D heats the thermoplastic filament in line with the commands it receives and flows it through a thin hole onto the printing platform, creating a solid object layer by layer, as if it is knitting. This method is called Fused Filament Fabrication (FFF).

B.3. PRODUCT FEATURES (*)

Printing Technology	FFF (Production with Heated Filament)
Print Volume	20x20x20cm (**)
Kinematics	Simple Cartesian
Idle Speed	150mm/sec
extruder	3:1 Ratio Geared Double Clutch
Number of Extruders	one
Position Accuracy	X – 12.5 micron Y – 12.5 micron Z – 2.5 micron
Layer Thickness	0.05 – 0.30mm
Nozzle Diameter	0.40mm (Optional: 0.20, 0.30, 0.50, 0.60, 0.80mm)
Filament Diameter	1.75mm
XY Axis Drive System	GT2 Belt
Z Axis Drive System	8mm Pitch Trapezoidal Screw
X Axis Guide	MGN12 Linear Rail
Y-Z Axis Guide	Double Row 8mm Chrome Plated Induction Shaft
Print Surface	3D Printing Surface with 9 detection zones for leveling
Bed Heater	Silicone Insulated 500 Watt
Connection	USB, SD Card, Flash Memory
Power	220 volts 600 watts max .
Operating temperature	15 °C – 30 °C
Storage Temperature	0 °C – 40 °C
Software	Cura, PrusaSlicer and other open source software
Dimensions	38 x 42 x 51 cm (excluding filament hanger)
max . Extrusion Temperature	260°C
max . Bed Temperature	110°C
Raw Material	PLA, PETG, FLEX (Shore 90A and above), ABS (1), ASA (1), PC-ABS (1)
Other	3.5” Color Touch Screen LCD Control Panel Automatic Bed Leveling Filament Detection Internal Lighting Saving Stopped Print

(1) With these raw materials, the printing success rate will be low due to the high shrinkage rates in the prints of models longer than 8 cm.

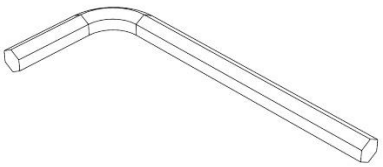
(*) Rigid3D reserves the right to make changes in product specifications without notice.

(**) Print volume height may be lower depending on the bed calibration.

SETUP

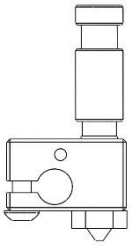
C.1. BOX CONTENTS

1.5-2-2.5mm Allen Key



Power Cord

Spare Nozzle -Block- Drum Set

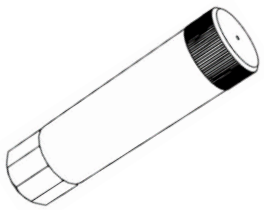


SD Card

Filament (1.75 mm PLA)

Filament Hanger

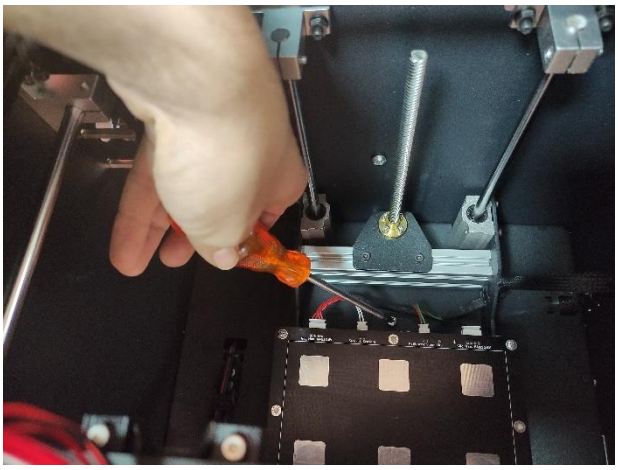
GIOTTO Stick Adhesive



C.2. SETUP

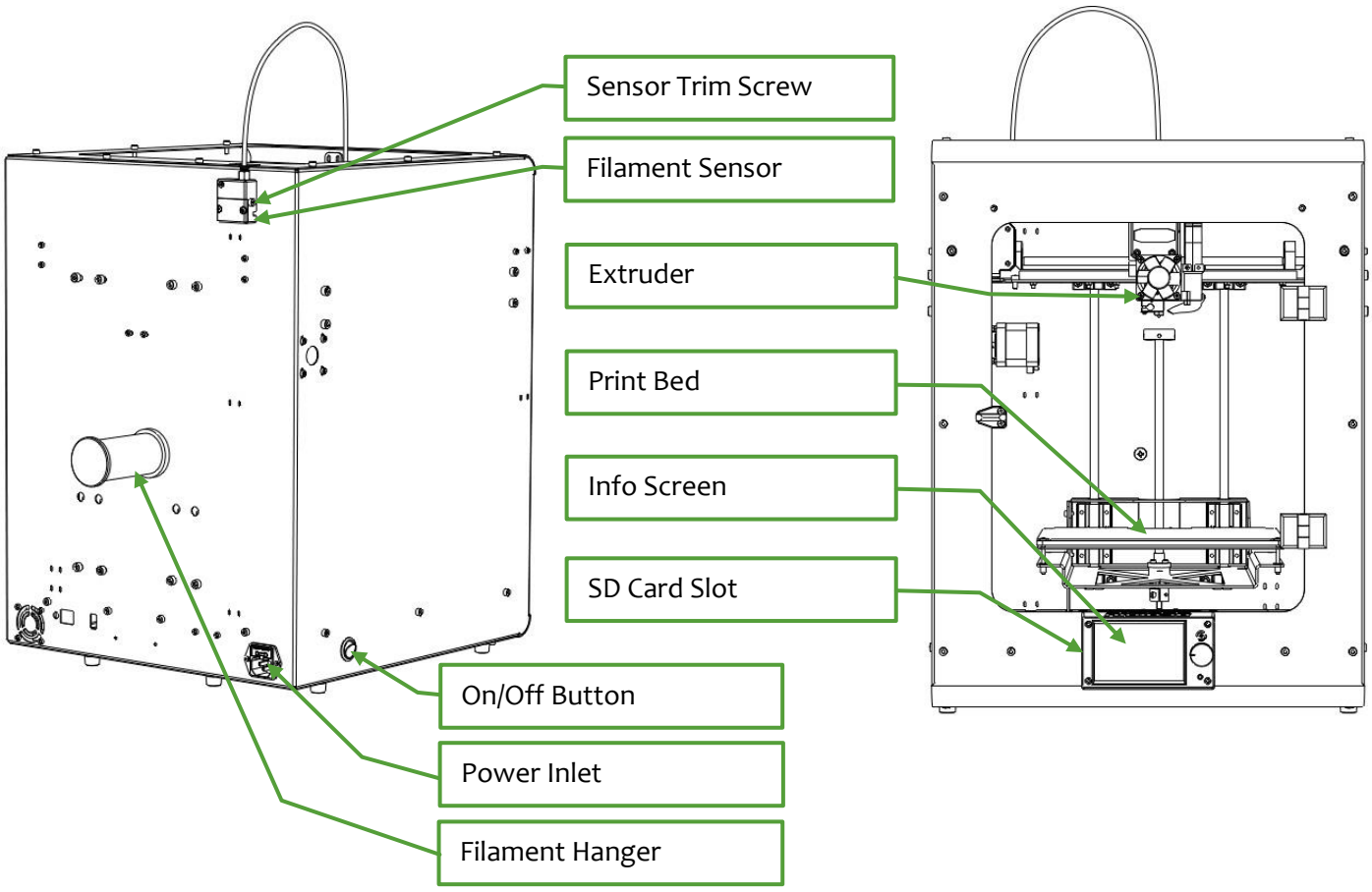
1. Open the box from the top and take out the styrofoam blocks from sides and front of the printer.

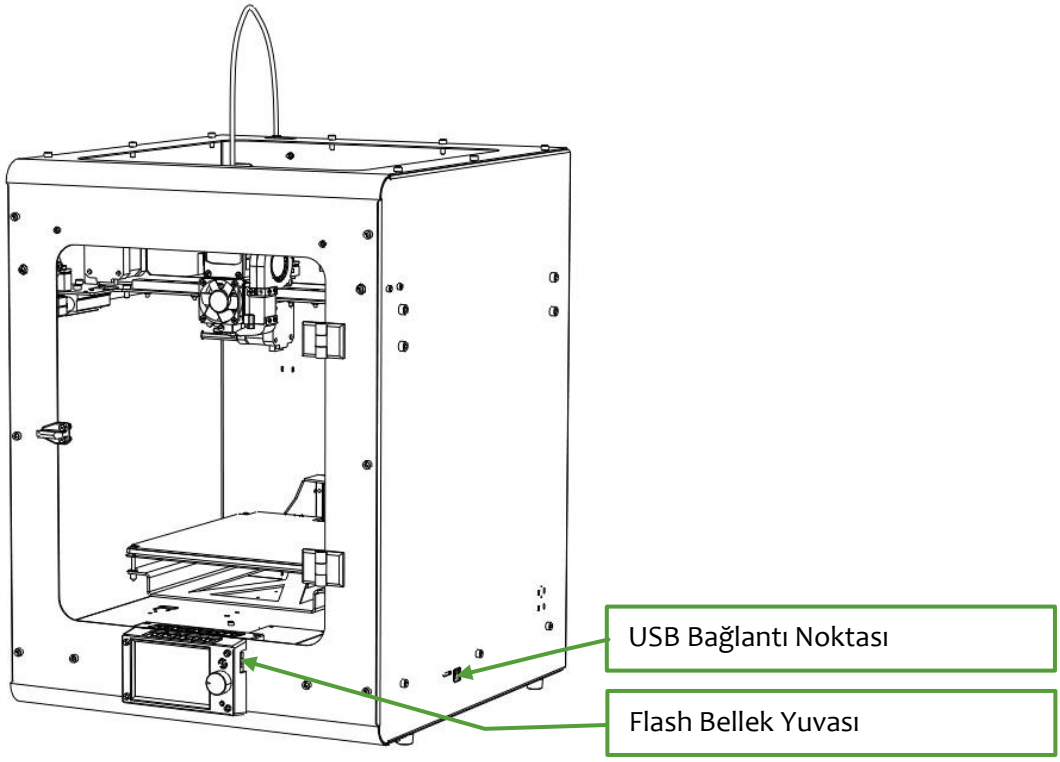
Caution!: If you try to take the printer out of the box without removing the Styrofoam from the front and sides of the printer, the device may be damaged.



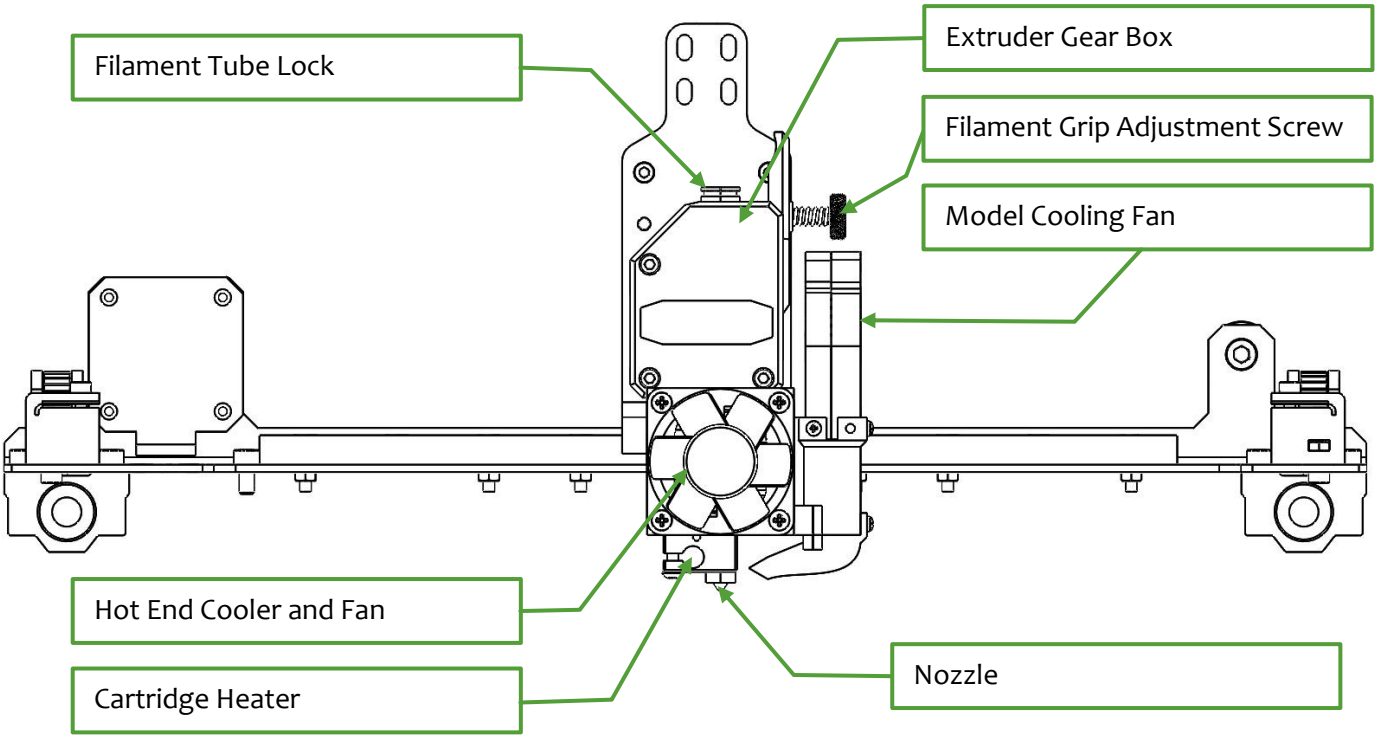
2. Cut the cable ties that secure the moving parts of the device. If you use cutting tools, be careful not to damage the drive belts.
3. Unscrew the filament hanger, which is mounted in the direction facing the inside of the device for shipping, with a Phillips screwdriver.
4. Mount the filament hanger in the same hole in the device body, with the hanger outside the device body.
5. Remove the Z axis shipping fixing screw using a Phillips screwdriver.
6. You can power the device by plugging the power cord into the device and into a 110/230 volt earth grounded socket.

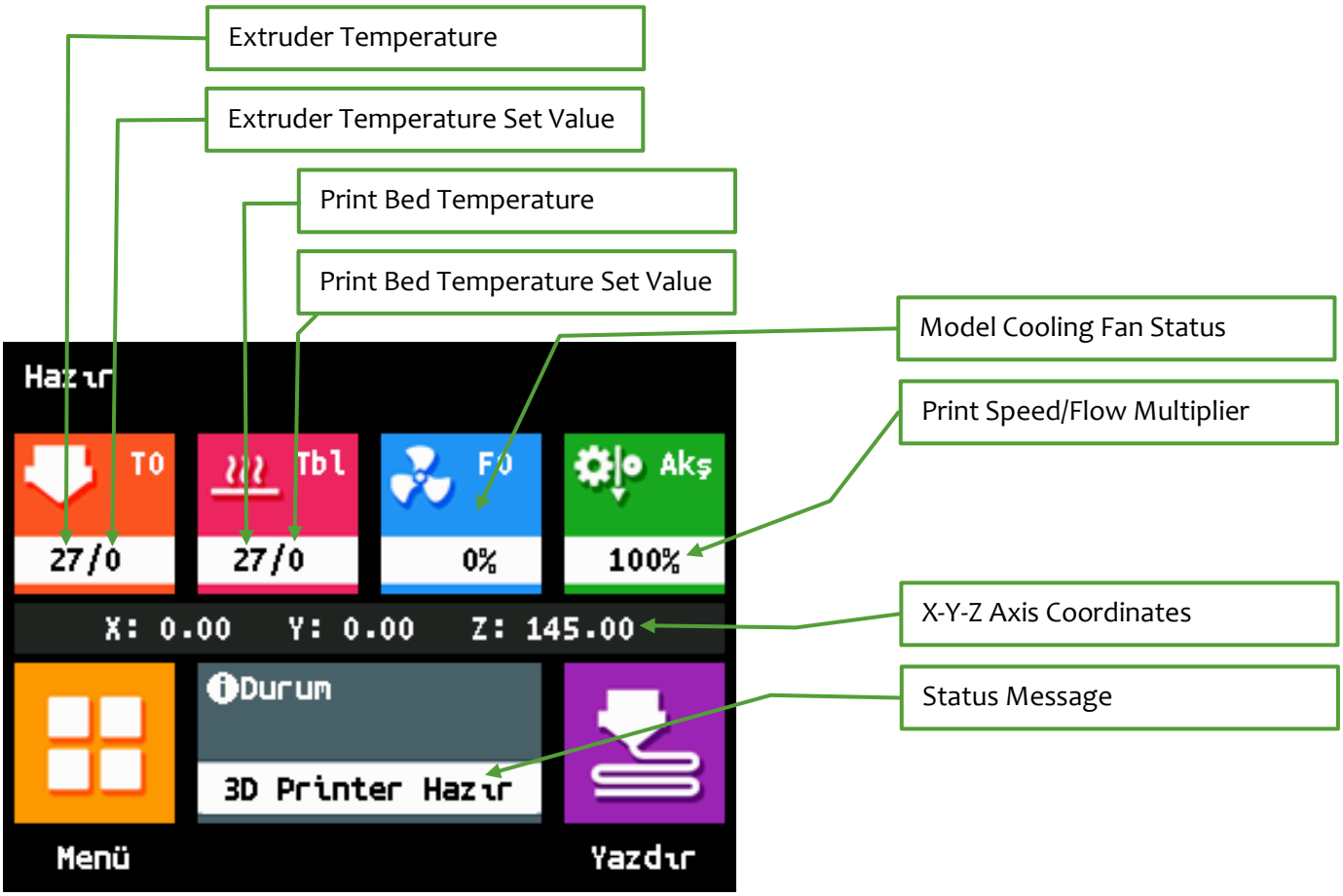
C.3. RIGID3D ZERO3 AT A GLANCE





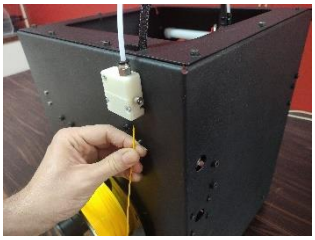
PRINT HEAD and INFO SCREEN

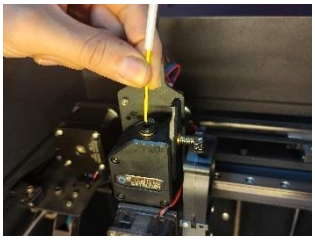




BASIC OPERATIONS

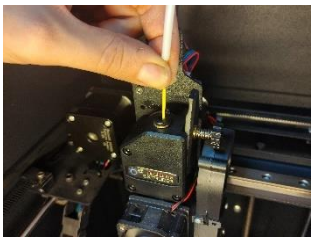
D.1. LOADING FILAMENT





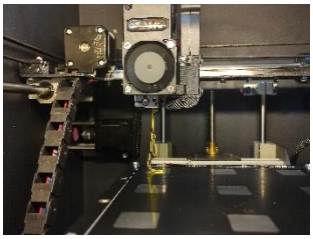
1. Attach the filament spool to the spool hanger.
2. Separate the filament hose from the extruder by pressing the filament tube lock and pulling the tube.
3. Cut the end of the filament at a 45 degree angle and send it through the filament sensor to the extruder.
4. Enter the filament loading unloading screen.
    a. Select a temperature suitable for your filament under preheating.
    b. Or select the appropriate extrusion temperature for your filament by tapping on the temperature value.

5. Wait for the temperature on the screen to reach the set temperature. Then push the filament into the hole on the extruder and press the load button.



It is important that you push the filament right in the middle of the hole. If the end of the filament is bent or you cannot center the slot exactly, the extruder cannot grasp the filament.

6. After a while, the extruder starts working and starts pulling the filament with its grip. At this point you can stop pushing the filament.
7. As the filament reaches the nozzle, it begins to flow from the tip of the nozzle. After flowing for a while, the continue flowing message appears on the screen. If the old filament is cleaned and the color of the new filament is seen flowing out the nozzle, you can stop the loading by selecting Done on the screen. If you do not stop, the process stops automatically after 10 cm of filament is flowed.



8. After the filament loading is completed, gently push the filament hose into its slot, select cooling on the screen and turn off the heaters of the device.

During this process, the tip of the extruder and the print bed will be at high temperature. Do not touch the tip of the extruder and the print bed during the process. Even after giving the cooling command, these parts will take time to cool down. Do not interfere with these parts without checking the temperatures on the control panel.

D.2. PREPARING THE PRINT BED

Stick adhesive should be applied to the surface before printing. We especially recommend the use of Giotto brand adhesive stick .

By applying adhesive several times, thick adhesive layer may form on the printing surface. In this case, you can clean the 3D printing surface with a wet wipe.

Before cleaning, make sure that the tray is not hot and turn off the power button of the device.

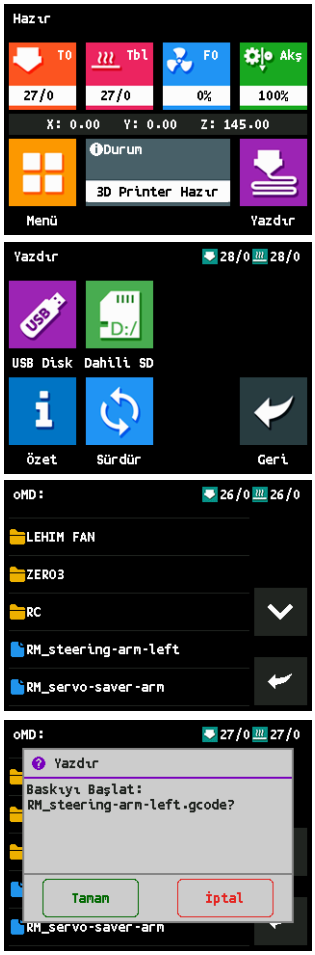
Do not use chemicals/detergents in the cleaning process. Chemical/detergent may cause the printing surface to lose its properties.

Take care that the 3D printing surface is not dusty, dirty and oily. The adhesion of the plastic to dusty, dirty or oily surfaces will be poor.

The 3D printing surface is a limited life part. It will wear out over time. When you experience a decrease in the print surface performance, replace it with a new one.

D.3. PRINTING THE SAMPLE FILE

First, print the sample model in the SD card sent with the printer !!!



1. Before starting to print, the filament must have been loaded to the print head and the print bed preparation must have been made.
2. Place the SD card or flash memory into its slot next to the screen.
   The ability to save and resume a stopped print is only supported for prints from an SD card.
3. Select the Print option on the screen and the media (SD or USB Disk) containing the gcode file.
4. Select the file you want to print from the file list and confirm your selection.
   When you select the process, the printer starts to heat the print bed first and then the extruder. Therefore, it is normal that there is no movement in the printer at first. You can monitor the heating status on the information screen. After warming up, the printer starts printing.
5. After printing is complete, wait until the print head temperature drops below 50°C. You can monitor the temperatures on the information display on the control panel.
6. After the temperature drops, you can hold the printed object firmly and move it left and right or remove it from the print bed with the help of a spatula .
7. Congratulations, you have completed your first 3D print.

It is important that you observe the first layer of prints. A problem you may experience during printing is that the plastic does not adhere to the print bed. If the first layer of the print does not adhere to the print bed, try applying Giotto glue stick to print bed and print again. If this is not a solution or if the nozzle is rubbing against the print bed, perform automatic bed leveling as explained in the maintenance and adjustment section.

CAUTION: Rigid 3D has moving and high temperature parts that can cause injury. In order to avoid any injury, do not interfere with the device during and after printing until the device cools down, and keep the device under the supervision of the operator throughout the print.

D.4. UNLOADING FILAMENT

1. Disconnect the filament tube from the extruder by pressing the filament tube lock and pulling the tube.
2. Enter the filament loading extraction screen.
    a. Select if there is a suitable temperature for your filament under preheating.
    b. Or select the appropriate extrusion temperature for your filament by tapping on the temperature value.
3. Wait for the temperature on the display to reach the set temperature. Press the unload button when the set temperature is reached.
4. After a while the extruder starts and pulls the filament back out of the extruder.
5. After you get rid of the melted lump at the end of the filament by cutting a piece from the end of the filament, you can take the spool from the hanger by winding the filament on its spool.
6. After the filament removal is completed, gently push the filament tube into its slot, turn off the heaters of the device by select cool down on the screen.

It is not necessary to remove the filament from the device after each print. If you are not going to change the filament, you can leave the filament loaded on the device.

During this process, the end of the extruder and the table will be at high temperature. Do not touch the end of the extruder and the table during the process. Even after giving a cooling command, these parts will take time to cool. Do not interfere with these parts without checking the temperatures on the control panel.

D.5. TURN OFF THE DEVICE

Check the extruder temperature on the screen before turning off your device. If the extruder temperature is above 55°C , do not turn off the device until the extruder temperature drops below 55°C . If the temperature is low, you can turn off your device with the power button. *If you turn off your device while the extruder is hot, the extruder cooling fan will stop. Stopping the fan while the extruder is hot can cause the filament to get stuck in the extruder.*

D.6. CREATING GCODE FROM STL, OBJ, AMF FORMAT MODEL FILE

In order to print from files in STL, OBJ and AMF formats, the model file must be loaded into a slicing software and the printing parameters must be set, and the software should create the GCODE file. You can use open source Cura or Prusa slicing software for this. The web addresses where you can download the programs are given below.

https://ultimaker.com/software/ultimaker-cura - https://www.prusa3d.com/page/prusaslicer_424/

D.7. FILAMENT SENSOR

If the filament sensor detects that the filament has run out during printing, the device pauses the print and waits for you to load a new filament. When you load the new filament by following the instructions on the screen, the device resumes printing from where it left off.

E

LCD SCREEN & OPERATIONS

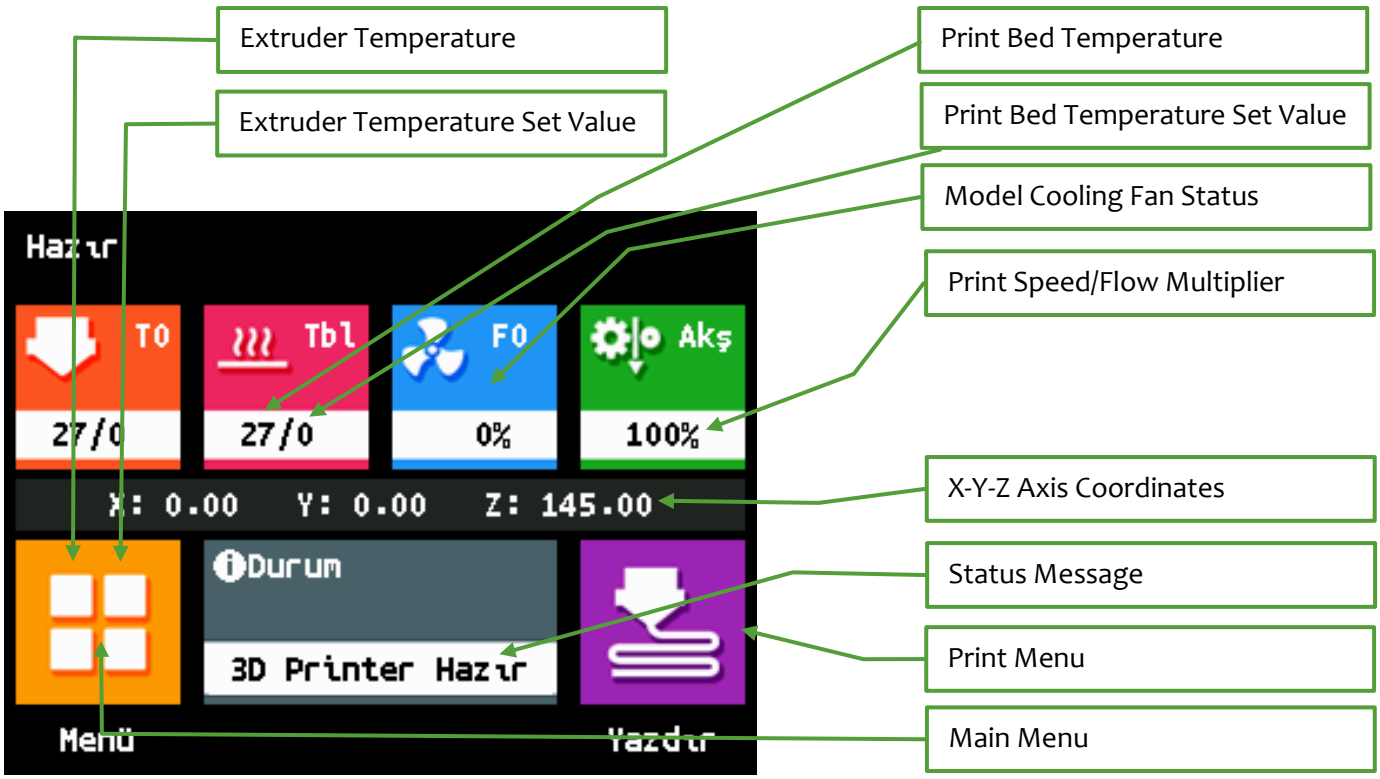
E.1. LCD DISPLAY

You can perform many operations of the device via the touch LCD screen. The LCD menu is variable and the menu structure changes according to the operation. The menu commands differ while printing and when the printer is idle.

In the following sections, the operations that you can control on the screen are explained on the basis of functions.

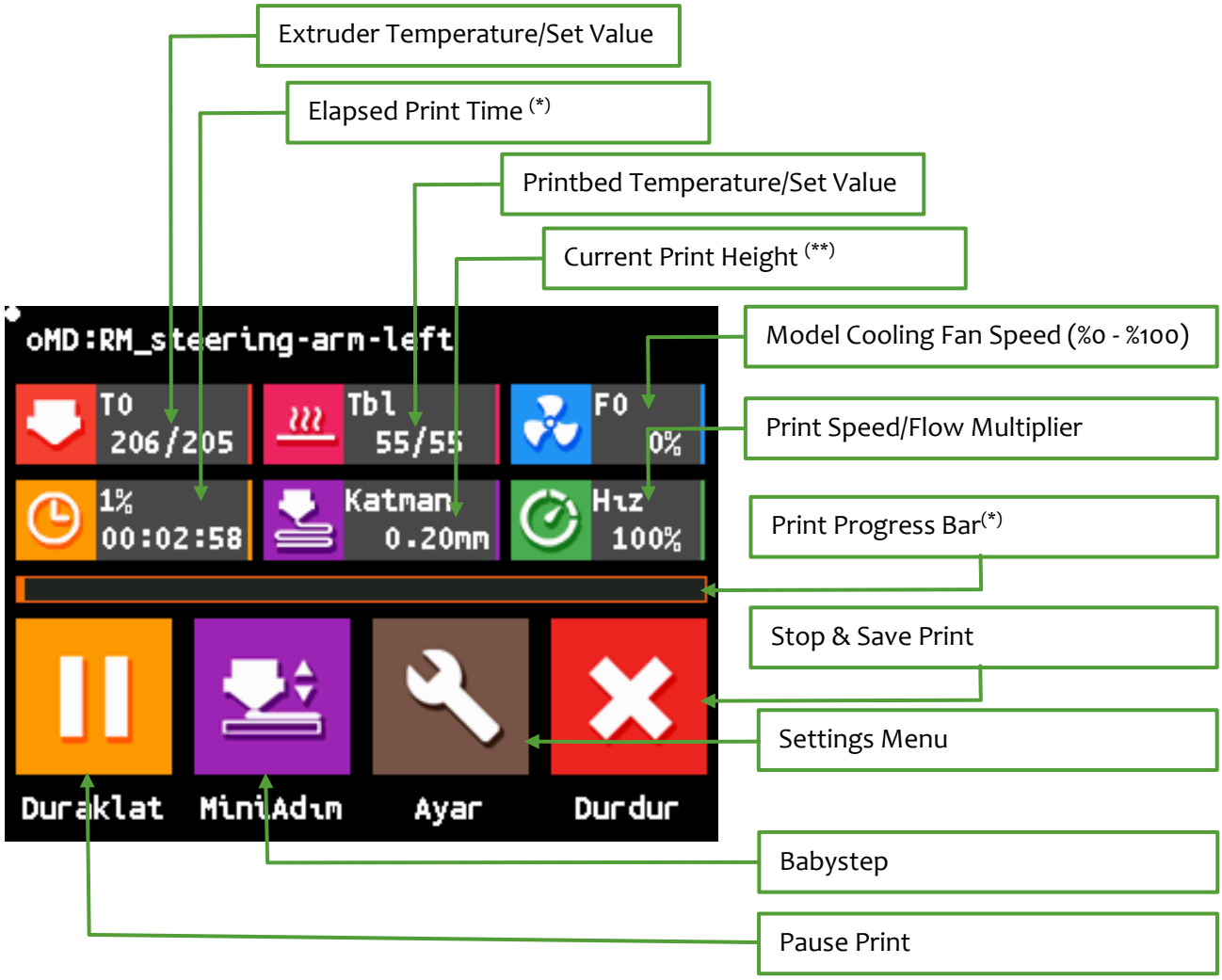
The current status of the device is shown on the status screen.

Status screen during standby:



Status screen during printing:

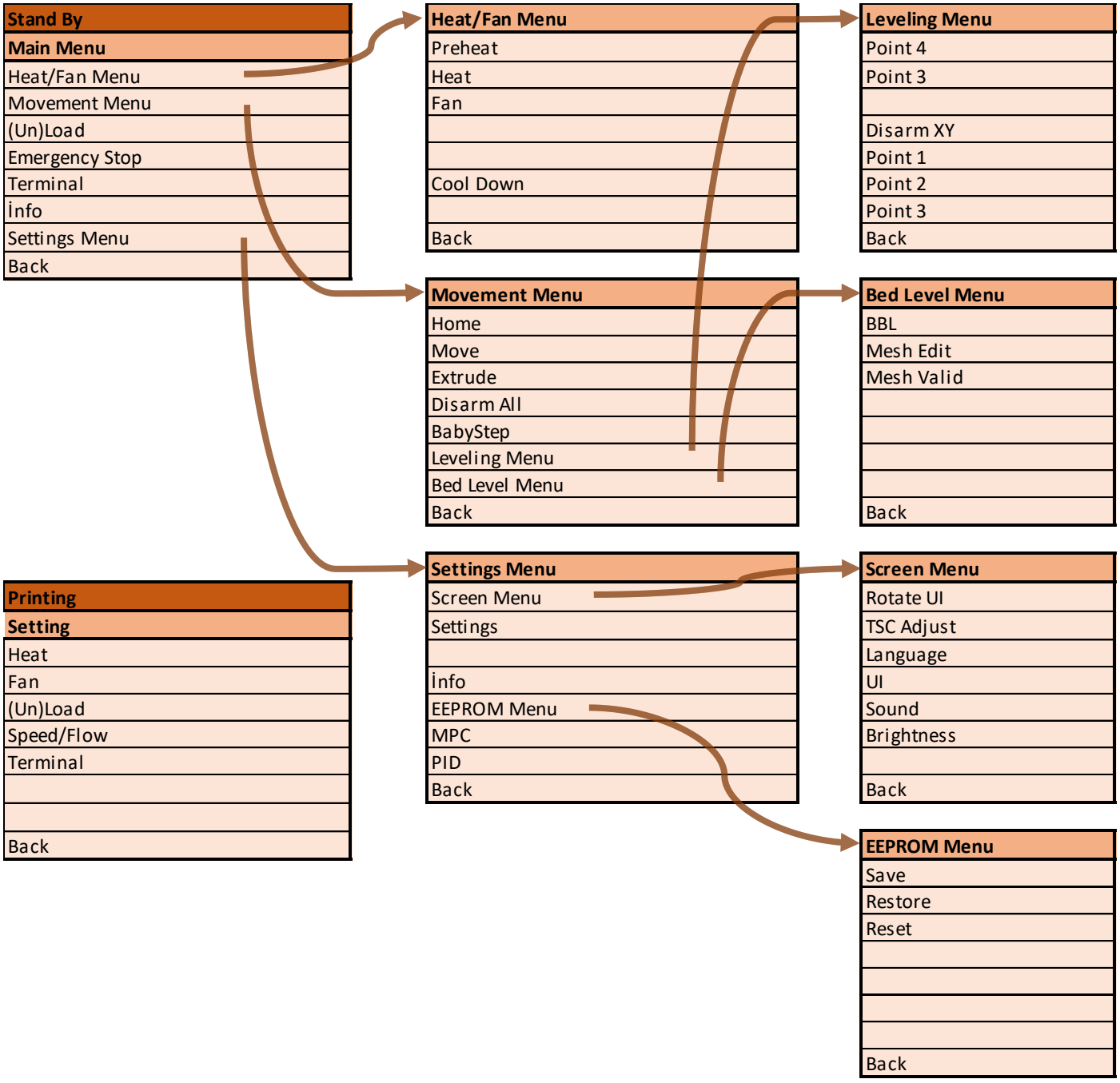
(*) Print time indicates how long the print has been going on. The percentage and indicator show the ratio of the number of lines processed in the gcode file to the total number of lines in the file. Since the processing time of each gcode line may be different, the percentage and indicator do not provide accurate data for the remaining



time of the print. It shows the estimated time of the print on the screen when the Cura program creates the gcode file (determines the tool path). The estimated remaining printing time can be calculated by subtracting the printing time from the time determined by Cura.

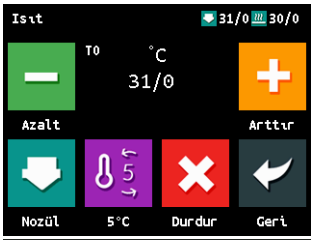
(**) The print height shows the height at which the device prints the part at that moment. In other words, it is the distance between the print bed and the nozzle . It is not the total height of the print.

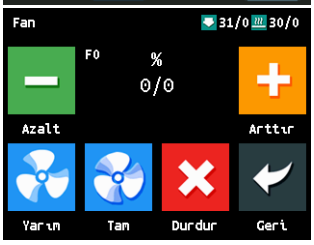
E.2. MENU TREE


Stand By
Main Menu
Heat/Fan Menu
Movement Menu
(Un)Load
Emergency Stop
Terminal
İnfo
Settings Menu
Back
Heat/Fan Menu
Preheat
Heat
Fan
Cool Down
Back
Leveling Menu
Point 4
Point 3
Disarm XY
Point 1
Point 2
Point 3
Back
Movement Menu
Home
Move
Extrude
Disarm All
BabyStep
Leveling Menu
Bed Level Menu
Back
Bed Level Menu
BBL
Mesh Edit
Mesh Valid
Back
Printing
Setting
Heat
Fan
(Un)Load
Speed/Flow
Terminal
Back
Settings Menu
Screen Menu
Settings
İnfo
EEPROM Menu
MPC
PID
Back
Screen Menu
Rotate UI
TSC Adjust
Language
UI
Sound
Brightness
Back
EEPROM Menu
Save
Restore
Reset
Back

E.3. OTHER OPERATIONS

E.3.1. ADJUSTING THE TEMPERATURE / OPERATING THE FANS





You can access the screens where you can adjust the nozzle and print bed temperatures and fan speed from the Heating/Fan menu or the settings menu during printing.

You can adjust the temperature of the print bed and extruder on the heat screen. There is a nozzle or print bed icon in the lower left corner of the screen. By touching the icon, you can switch between nozzle and bed settings.

The Nozzle icon in the picture on the right shows that the nozzle temperature is set. The temperature setting can be increased or decreased with the plus and minus icons. By touching the 2nd icon on the bottom row, you can select how much the temperature will be increased or decreased using + and -. A value of 1, 5 or 10 can be selected.

Instead of touching the + and – icons, the temperature value can also be entered using the numeric keyboard, which will be presented by touching the temperature value.

The speed of the model cooling fan can be adjusted from the fan screen. 0% speed makes the fan stop and 100% speed makes the fan run at full speed. The operation of the screen is as in the heating screen described above. Each time the + and – icons are touched, the fan speed will increase or decrease by one. Half speed (50%) or full speed (100%) can be selected quickly by touching the half and full icons. Again, by touching the speed ratio, the speed value can be entered from the presented keyboard.

The nozzle and print bed can be quickly adjusted to certain temperatures from the preheating screen . In this screen, temperatures that are generally valid for some filaments are set. If these values match the filament you are using (in other words, if you are using PLA filament and 205/60 values are suitable for your filament), you can quickly start the warm-up process from this screen. By touching the 3rd icon in the 2nd row, you can choose whether only the nozzle , only the print bed or both are heated.

E.3.2. MOVING THE PRINT BED, PRINT HEAD, EXTRUDER

You can only perform these operations when the printer is not printing. You can access the operations from the movement menu.

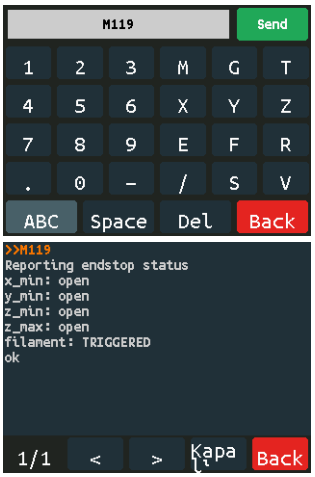
Home causes the printhead to return to the zero position on the X, Y, and Z axis. The X , Y and Z operations move the printhead to the zero position on the corresponding axis.

You can move the X, Y and Z axes from the move screen. You can select how much each touch of the movement keys will move the relevant axis with the icon at the end of the 1st row. 0.1mm/1mm/10mm values can be selected. If no homing has been made since the device is turned on, the move operations will not work. It will work after homing.

Using the filament screen extruder may be commanded to advance or retract the filament. For the extruder to operate, nozzle temperature must be above 170° C. If the temperature is lower, the extruder will not advance or retract filament even if commanded.

After any homing operation or move of the printhead, device will maintain the last position and it will not be possible to reposition the printhead by hand. The Disarm All action can be used to release the position lock of axes and make them maneuverable by hand again.

E.3.3. TERMINAL SCREEN



Your 3D printer communicates with peripherals with gcode commands. The LCD screen also talks to the processor of the printer with these commands and shows the user the information it receives from these commands in a simple way (for example, temperature and location information) and transmits the commands it receives from the user to the processor of the printer with these commands.

Terminal screen enables gcode commands to be written and sent to the processor manually and processor's responses to be displayed to the user without connecting any computer to the device. In this way, operations that do not have a special place on the screen can be performed by the printer or can be used for error diagnosis in special cases. This screen is mostly for the use of service operators. Do not use this screen unless a service representative asks you to take action from this screen. Your unconscious use may cause undesirable results on the device.

E.3.4. SERVICE TIME / INFORMATION DISPLAY

By using the Information screen in the main menu, you can find out the statistics about the prints your device has made so far and the printing time remaining until the next service time.

On this screen, the total number of completed and half-cut prints, the total print time, the longest print job time and the total filament length used in the prints are reported. In addition, the remaining printing time is reported for the maintenance of 100 hours, 600 hours and 1200 hours.

When the service time comes, when you turn on the device for the first time or when you enter the information screen, the popup screen informs you that the service time has come. In the popup that opens , an option to reset the service counter or cancel the message is offered. If reset is selected, the counter is reset and starts counting down for the next service time. If Cancel is selected, the message will be cleared, but the counter will not be reset and the message will be repeated the next time you turn on the device.

E.3.5. SCREEN SETTINGS

You can access the settings related to the device screen in the Screen menu located under the setting menu. From this menu

- You can change the screen orientation,
- If there is a shift in the touch, you can initiate calibration,
- You can set the language as English or Turkish,
- You can change the the display of information on the screen interface,
- You can adjust sound feedback volume,
- You can adjust the screen brightness level.

E.3.6. PARAMETER SETTINGS

The physical structure of the device is adjusted in the settings screen located under the Settings menu. Do not change these settings unless you are directly asked to change a setting on this screen by the service representative. An error in the settings may cause your device to malfunction or even cause damage to your device.

E.3.7. PROCEDURES DURING PRINTING

You can perform some operations on the LCD screen during printing. Actions you can take:

- Changing the nozzle and print bed temperature,
- Changing fan speed,
- Changing the print speed and flow multiplier,
- Pause print,
- Make baby-step adjustment (Refer to G.2. AUTOMATIC BED LEVELING AND BABY STEP ADJUSTMENT for details.)
- Stop the print,
- Start filament change routine
- Sendi a G-code command from the terminal screen to the printer.

SAVE PRINT

F.1. SAVE PRINT

When the Stop option is selected during printing, the device saves the current state of the print by creating a file named PLR on the SD card and stops printing. The PLR file is not listed on the device's LCD, but the PLR file can be seen in the file manager when the SD card is inserted into the computer.

Although the print saving algorithm has been created to minimize the defect that will occur on the model and to keep the print continuity at the highest level, this feature does not guarantee that the print will continue without any problems later on. Therefore, it is an "Experimental" feature.

Keep the device under operator supervision throughout the entire printing process. Never print from the device without operator supervision. Do not interfere with the electrical installation of the device.

The save print and continue feature is only supported for prints made via "SD Card".

The gcode file in which includes the original print must also be present on the SD card, as well as the PLR file .

For continuing print from the saved point, the printed part of the model must not be separated from the plate. If the model is not stable on the print bed or excessive separation is observed on one side, do not try to continue a saved print.

If the PLR file can be successfully created in the SD card after recording, the device detects the PLR file when it is first turned on and opens the interrupt recovery message window on the screen. If the resume option is selected in this window, the device starts to warm up and tries to resume print from where it left off. If the Stop option is selected, the device will delete the PLR file and you will not be able to continue print later.

If you have never turned off your device after the print was stopped and the PLR file was created, instead of selecting the media with the model in the Print menu, you can continue the recorded print by tapping the Resume option.

If another print is started, the PLR file of the previous print will be deleted and you will not be able to continue your old print.

The point where the print is interrupted may be weaker than the other sections of the part, and a change in mechanical properties may be observed.

F.2. PRINT RECOVERY

You can ensure that the print status is constantly recorded in the PLR file at the beginning of each new layer during a print. To do this, you need to activate the Power Loss Recovery option on the settings screen.

The use of this feature is not recommended due to the following drawbacks.

- Since the device will continuously record while printing, it consumes a lot of processor power for operations other than printing. As a result, software crashes, freezes and a decrease in print quality may occur.

- Since there will be constant writing and deletion of files to the SD card, the lifespan of the SD Card will be seriously shortened and reading and writing errors related to the SD Card will begin to occur in a short time.

When this feature is activated, even if the printing is interrupted for an undesirable reason - such as a power outage or unplugging the device - you can continue printing from that point on, as the status of the print will be automatically saved for the beginning of the last layer. How to continue an interrupted print is described on F.1. Save Print section. If there are any problems with the log file, you may not be able to continue printing.

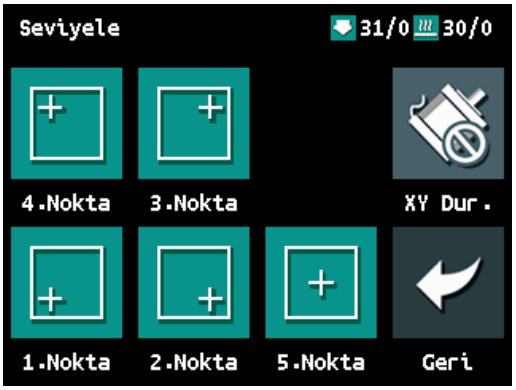
Unlike the save print described in F.1, the success rate of prints maintained in this way will be much lower and the defect on the part will be much more evident. In save print, the situation at the time of stopping the print is recorded, while with this feature, the recording is made at the beginning of each layer. This means that the print is started a little before the last moment, not from the last point of the interruption. Since a part of the model will be produced for the second time, the defect may be evident at the joint of the part, the part may move or axis shift may occur as the nozzle will rub against the unfinished model during the continuation .

G

MAINTENANCE and CALIBRATION

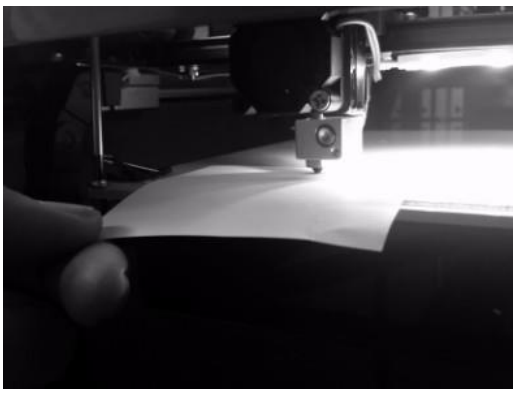
G.1. BED LEVELLING

The parallelism of the print bed of your device is set at the factory. If you need to intervene in the screws of the table over time, the mechanical parallelism adjustment must be made again. If the table screws are not intervened, this adjustment is not necessary and it is sufficient to use automatic bed leveling.

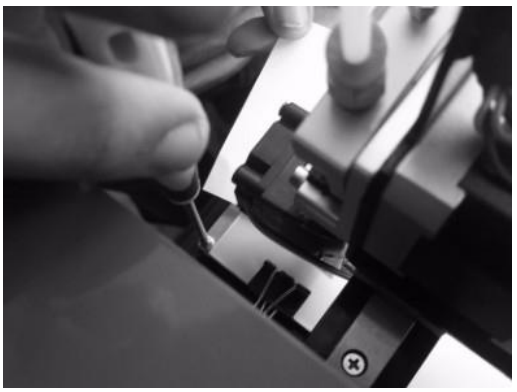


1. Make sure the extruder is not hot and clean any plastic residue from the tip of the nozzle .

2. Enter the levelling screen in the move menu. You need to make adjustments for the first, second, third and fourth point. When you select each point, the printer's head will be positioned on the point shown in the icon.



3. Place a piece of paper (80gr/m^2) between the nozzle and the bed. While moving the paper back and forth, adjust the distance between the nozzle and the bed by turning the table adjustment screw in the corner closest to the corner you are adjusting with a Phillips screwdriver. As a result of the adjustment, while the paper can move freely under the nozzle, it should rub lightly against the nozzle. Do this for all 4 points. Do not adjust for point 5.

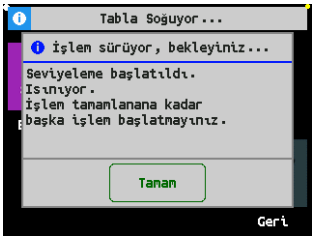


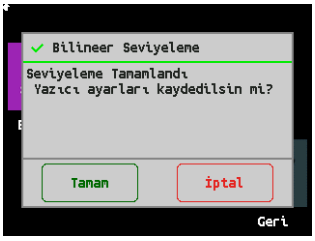
4. By selecting the Next Corner operation on the control panel, the print head is positioned near the right rear and left rear adjustment screws, respectively, and adjustment is made from the screws near the head as in the previous steps.

5. Since the adjustment made on the bed adjustment screws affects the position of the bed in combination, the position change in all screws affects the adjustment of the other screws. Therefore, perform the adjustment operations once more for each point.

After the adjustment is completed, automatic bed leveling and babystep adjustments should be made.

G.2. AUTOMATIC BED LEVELING AND BABYSTEP ADJUSTMENT





The bed leveling of your device has been adjusted at the factory. However, during transportation or depending on use over time, the parallelism of the table to the X and Y axis may deteriorate. If the nozzle stays high while the first layer of your print is being created and the filament cannot hold onto the build plate, or if the nozzle stays too close to the build plate and rubs against the build plate, or after a nozzle change, you need to relevel the build plate.

Perform the automatic bed leveling process in the following order:

1. Remove the filament.
2. Ensure that the table is clean and dry, free of glue and print residue.
3. the nozzle is clean without any plastic residue.
4. After cleaning the bed and nozzle, *enter the Bed Level menu under the Movement menu and* start the bed leveling by touching the BBL icon. The device will start to warm up. At the end of the warm-up, the device will determine the distance of the bed at 9 points by touching the nozzle to the bed at 9 different points.
5. When the process is complete, a message will appear on the screen. If the process is completed properly, you can approve to save the settings.

Do not leave the device unattended during the leveling and in case the device does not detect that the nozzle touch to the bed, stop the process by pressing the device off button.

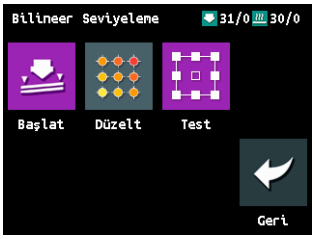
After completing the process, observe the first layer of the print. If the nozzle remains far from the bed, or the first layer does not stick to the bed well enough, or the nozzle rubs against the bed, *touch the BabyStep icon and* adjust offset.

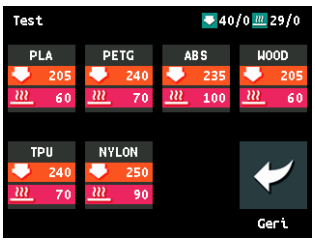
While adjusting the offset, the bed will approach or move away from the nozzle. The decrease in the offset value causes the bed to get closer, and its increase will cause it to move away. Adjust the offset until you can observe that the first layer is properly laid on the bed. Save your setting by touching the save icon before exiting the screen. Once the setting is saved, the setting will not be required for your next prints.

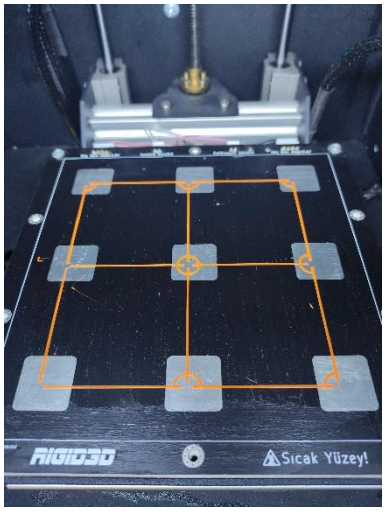
G.3. TESTING THE BED LEVEL

You can test the bed level of the device with the Mesh Valid operation in the Bed Level menu under the Movement menu.

When the Mesh Valid icon is touched, a screen similar to the pre-warming screen opens to determine the appropriate temperature for the filament you will use for test print. After selecting the appropriate temperature on this screen, the device heats up and prints the test pattern.

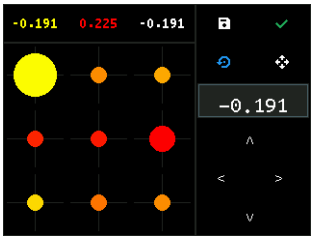






The test model is shown in the picture below. If the model is laid on the bed properly, the bed level is correct. When printing the model, the first few lines may not be printed due to the lack of filament in the nozzle . This is not a problem.

G.4. MANUAL CORRECTION OF TRAY SETTING



Under normal conditions, when automatic bed leveling is performed, the device correctly determines the height of 9 points and regulates the combined movements of the print head and the bed, taking into account this topography data during printing. However, if you still want to interfere with the height measurement of a certain point, you can use the Mesh Edit operation in the Bed Level menu.

On the Mesh Edit screen

- As soon as the screen is entered, the device performs axis reset.
- The offset values of the point closest to the nozzle , the farthest point and the selected point are shown on the top line of the screen .
- Navigate between selected measuring points with arrows. The largest circle indicates the selected point.
- Changes made are saved by touching the floppy icon.
- With the blue return button, the screen is exited without making any changes.
- Axes can be reset by touching the 4 arrow icons next to the blue return key.
- By touching the green tick icon, the changes are accepted and the screen is exited. If changes have been made, a prompt is asked to save the settings on exit. (Even when not saved explicitly, the changes made will remain valid until the device is turned off. If the device is turned off and on and previous changes were not saved, height values before the edit would be loaded.)
- When the offset value in the right column (in the picture - 0.191 value) is touched, the setting screen is accessed.

On the Setting Screen

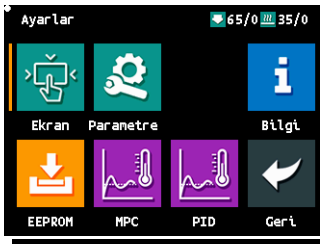
- The device positions the nozzle at a height of 0.1mm from the selected point. (Standard 80gr/m² A4 paper thickness is about 0.1mm .)
- The scale of the movements can be selected as 0.01mm, 0.1mm or 1mm with the first icon on second row.
- Using a piece of paper between the nozzle and the bed, you can adjust the offset value by Up and Down icons. Try to get the paper rub against the bed and the nozzle while It can move freely.

G.5. TUNING WARM-UP PARAMETERS (PID)

Device uses PID (Proportional Integral Derivative) method to keep the bed temperature constant, and uses model predictive control method to keep the extruder temperature constant.

The parameters related to these methods can be determined by monitoring the heating and cooling cycle of the device by running the adjustment process. Perform the adjustment procedure only when the heaters of the device are changed or if the device cannot keep the temperature value stable. Operating this setting frequently will not benefit accurate temperature control and may reduce accuracy.

The setup process is lengthy and can take up to 30 minutes. Start the adjustment process by taking this time into account and do not start any other operations until you receive the setting completed message. On exit, you will be asked if you want to save the settings. Choose to save. Even if you do not save the operation, the settings remain valid until the device is turned off. When it is turned off and on and new adjustment were not saved, old settings are retrieved. If you choose to save, the new settings remain valid even if the device is turned off and on. If you accidentally do not save the settings upon exit, you can save them by selecting Save from the EEPROM menu .



G.5.1. PID TUNING FOR THE BED

PID tuning screen is under the Settings menu. You can tune the PID for different temperature values. We recommend 80°C. After selecting the temperature, the process is started with the Start icon. Wait until the message that the process is complete appears on the screen and exit the screen at the end of the process.

G.5.2. MPC TUNING FOR THE EXTRUDER

MPC tuning screen is also under the Settings menu. For MPC tuning, 2 parameter values must be given. These are (P) the power of the extruder heater and the heat capacity per mm of the filament used (H). A 50-watt heater was installed in your device during production. The heat capacity values that you can use for popular filaments are given in the adjacent table. The values in the table are average data, and the filament manufacturer can give the most accurate heat capacity value for the filament you use. After the desired parameters are determined and entered from the parameter icon, the process is started with the Start icon. Wait until the message that the process is complete appears on the screen and exit the screen at the end of the process.

filament	Heat Capacity/mm
ABS	0.00515 J/K/mm
Nylon	0.00522 J/K/mm
PETG	0.0036 J/K/mm
PLA	0.0056 J/K/mm

G.6. DAILY CHECK

Visually check your device before starting a print. Things to check:

- The print bed is dust-free and oil-free.
- The adhesive layer on the print bed is not too thick
- No residue from previous prints on the print bed
- Crushing, breaking and disconnection in the cables, cable connections and main power cable
- No loosening or sagging in the connection of any part

If necessary, remove the print bed and clean it under running water. After cleaning the printing surface, do not place it in the device before it is completely dry. If you detect a problem with the cables or any part, do not use your device without receiving technical support from the manufacturer.

Keep the inside of your device clean. Do not put any material inside the device and take care not to let dirt, dried sticky glue residues get under the device.

G.7. 100 HOURS MAINTENANCE

Lubricate the Y and Z axis guide shafts, X axis rail and Z axis trapezoidal screw regularly with NLGI 00 grade grease after every 100 hours of printing. You can procure the oil from https://www.sutasmarket.com/3d-yazici-yatak-mili-yagi .

G.8. 600 HOURS MAINTENANCE

In addition to the 100-hour maintenance replace the Nozzle-Heat Block-Heat Break part with new ones after every 600 hours of printing. You can procure the required part from https://www.sutasmarket.com/nozul-blok-barel-seti .

G.9. 1200 HOURS MAINTENANCE

Annually or after every 1200 hours of printing (whichever comes first)

- Lubricate the Y and Z axis guide shafts, X axis rail and Z axis trapezoidal screw with NLGI 00 grade grease.
- Replace the Nozzle -Heat Block- Heat Break part with new ones.
- Replace the extruder cartridge heater and temperature sensor with new ones. You can supply the required part at https://www.sutasmarket.com/ekstruder-isitici-isi-sensoru .

G.10. CLEANING

Before cleaning your device, make sure that the power button is off and device is unplugged.

You can wipe the outer metal surface of the device with a slightly damp cloth. Do not use detergent.

We recommend that you do not wipe the guide rods, X-axis rail and Z-axis screw. If you have to wipe it, re-lubricate the shafts with NLGI 00 grade grease or the oil mixture you used for monthly maintenance.

WARNING: Before servicing your device, make sure that your device is turned off and unplugged. Never interfere with the power supply of the device, even if the device is turned off and unplugged.

TROUBLESHOOTING & SUPPORT

H.1. TROUBLESHOOTING TIPS

If you experience a problem with your device, this section will guide you in diagnosing and solving the problem. Please check this section before requesting technical support for your device.

PROBLEM	POSSIBLE CAUSE	SOLUTION
The printer does not turn on.	The printer is not getting power.	Check if the power cord of the printer is plugged in.
		Check that the power button is in the on position.
		Check if there is power in the socket by connecting another device to the socket you connected the printer to and checking if it works.
		Try operating the printer with a different power cord. Depending on the usage, the broken power cable may be preventing the power supply to the device.
		Check the glass fuse located on the power input socket of the device. If it is burned, replace it with a new one. If the new fuse blows again, consult the service.
"Thermal Problem" or "Heat Failed" appeared on the LCD and the printer stopped.	In case the temperature sensors come off, your printer will stop printing and go into standby mode by giving the Thermal Problem message when the temperature drops rapidly, to prevent the heaters from working excessively and creating dangerous heat.	Check whether the extruder and print bed temperature sensors are in place.
		Check if there are any cables hanging loose from the extruder and print bed.
		After performing the above checks, you can turn the printer off and on to get it out of error mode .
		If the error recurs, perform the PID calibration described in G.5 section.
		Try printing with the model cooling fan turned off.
		If the problem is caused by the extruder , replace the cartridge resistance and heat sensor.
Err Max Temp appeared on the LCD screen and the printer stopped.	If the extruder temperature exceeds 260°C or the print bed temperature exceeds 120°C, your printer stops printing and goes into standby mode to protect it from damage caused by high temperature. This problem can also be encountered if there is a short circuit in the temperature sensor wires, even though it is not actually a high temperature.	Check if the temperature is really high.
		Check whether there is a short circuit in the sensor connection sockets.
		Replace the temperature sensor.
		If the temperature is really high or you cannot detect a short circuit, contact the technical service.

PROBLEM	POSSIBLE CAUSE	SOLUTION
The print bed does not heat up.	Bed heater power is disconnected.	Start the preheating process from the printer LCD screen . If the bed is warming up with the pre-heating command, check the GCODE you have prepared. If the bed does not warm up with the pre-heating command, contact technical service.
	Bed temperature was not entered correctly in the print settings.	Check the bed temperature in the slicing software. After entering the correct temperature value, slice the model again, prepare a new GCODE file and print the new file.
LCD screen temperature shows 0˚C or -14˚C.	There is a break in the related temperature sensor connection.	Check the temperature sensor connectors. If the problem is not solved, contact the technical service.
Extruder does not heat up.	Extruder heater power is disconnected.	Start the preheat process from the printer LCD screen . If the extruder does not heat up with the preheat command , check that the power connection of the extruder heater is properly connected to the relevant connector. If you cannot detect a problem in the connection, contact the technical service.
	Extruder cartridge heater expired / failed	Replace the extruder cartridge heater and temperature sensor.
	Extruder temperature is not entered correctly in print settings .	Check the extruder temperature in the slicing software . Prepare a new GCODE file by slicing the model again and print the new file.
The printed object moves on the bed during printing or does not adhere to the bed at all.	No adhesive has been applied to the bed.	Apply glue stick to the bed. (Use GIOTTO brand glue stick.)
	Adhesive or model residue from previous printed models has accumulated on the bed to such an extent that it disturbs the flatness of the bed.	Clean the bed from adhesive residues under running water with a scouring pad and apply a new coat of GIOTTO glue stick.
	The temperature of the bed is not set correctly.	Check the print bed temperature in the slicer settings. After setting the recommended 100˚C for ABS printing and 60˚ C for PLA printing, slice the model again and print from the new GCODE file.
	Bed is not levelled.	Run the auto bed levelling as described in the relevant section of the manual.
The nozzle is rubbing against the print bed, or the first layer of plastic is printed too thin, or there is a clicking noise from the extruder motor when printing the first layer, the motor cannot push the filament.	Adhesive or model residue from previous printed models has accumulated on the bed to such an extent that it disturbs the flatness of the table.	Clean the bed from adhesive residues under running water with a scouring pad and apply a new coat of GIOTTO stick stick.
	Bed is not levelled.	Run the auto bed levelling as described in the relevant section of the manual.

PROBLEM	POSSIBLE CAUSE	SOLUTION
During the print plastic flow from the nozzle is not sufficient or the plastic flow stops during printing, the extruder motor rattles, the filament pusher wears the filament.	Extruder fan not working.	Check the extruder fan connection cables.
		Turn the fan blades by hand. If there is a tightness, loosen the fan attachment bolts a little.
		Replace the defective fan with a new one.
		If the fan does not work despite the above steps, contact the technical service.
	Extruder temperature is low	Set the extruder temperature to 5° C higher in the slicer settings , slice the model again and print from the new GCODE file.
		If printing is in progress, enter the temperature screen in the LCD menu and increase the temperature by 5° C.
	Filament spool is stuck	Loosen the jam that prevents the filament spool from turning freely.
	Nozzle clogged	Replace the Nozzle -Heat Block- Heat Break part with new ones
	Print speed is high	After setting the print speed to 30mm/sec or below in the slicer settings, slice the model again and print from the new GCODE file.
		If printing is in progress, select Speed/Flow in the LCD menu and reduce the speed multiplier.
The nozzle keeps getting clogged.	Extruder temperature too high Very high temperatures cause the plastic to caramelize, forming hard pieces. These parts may block the fine nozzle hole.	Gradually lower your extruder temperature setting in the slicing software and observe the result.
	Filament is dusty	Set up a mechanism to clean the filament before it enters the extruder . We recommend the solution at the address below. https://youmagine.com/designs/universal-filament-filter
	Extruder inner insulation is worn out.	Replace the Nozzle -Heat Block- Heat Break part with new ones

H.2. TECHNICAL SUPPORT

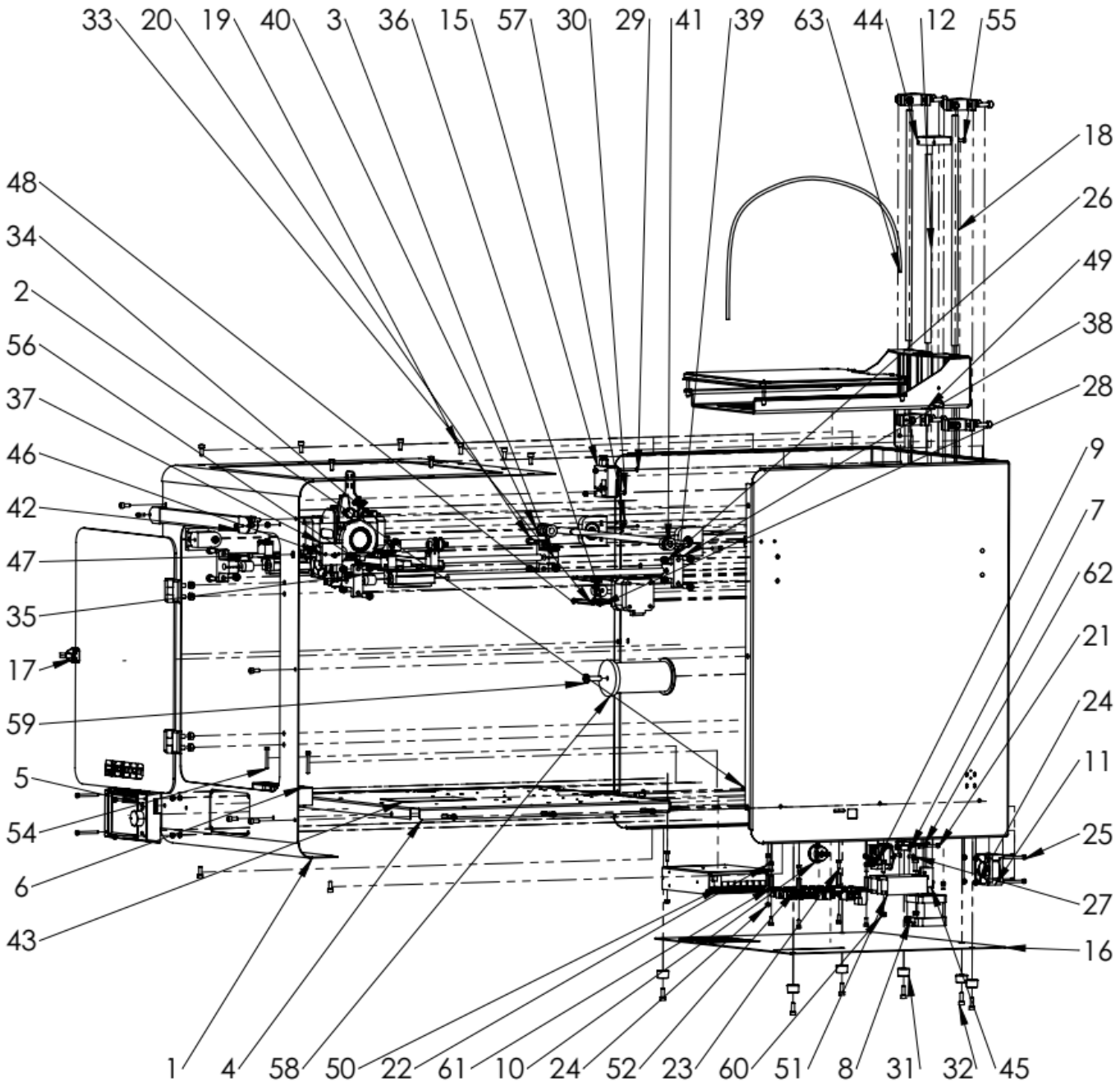
If you encounter a problem that is not mentioned in this user guide, please send your problem to us via our support (ticket) system. https://www.rigid3d.com/destek-talebi/

You can join our Facebook support group. http://www.facebook.com/groups/rigid3d

You can follow support videos on our Youtube channel. https://www.youtube.com/c/RIGID3D

The models of the 3D printed parts used in your printer are available at https://www.rigid3d.com/model-dosyalari/ You can produce spares when necessary.

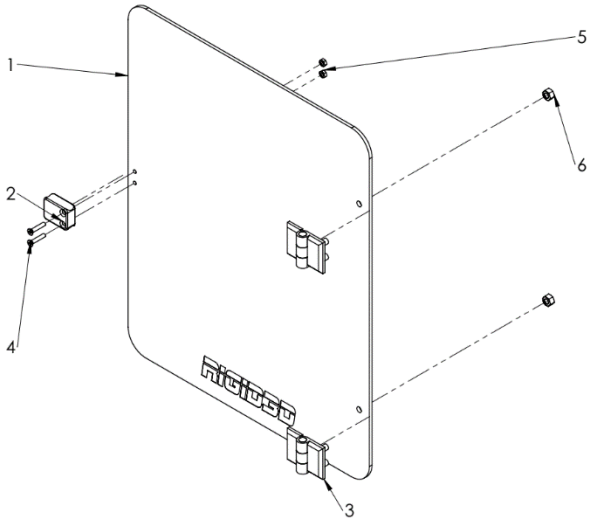
H.3. PARTS LIST



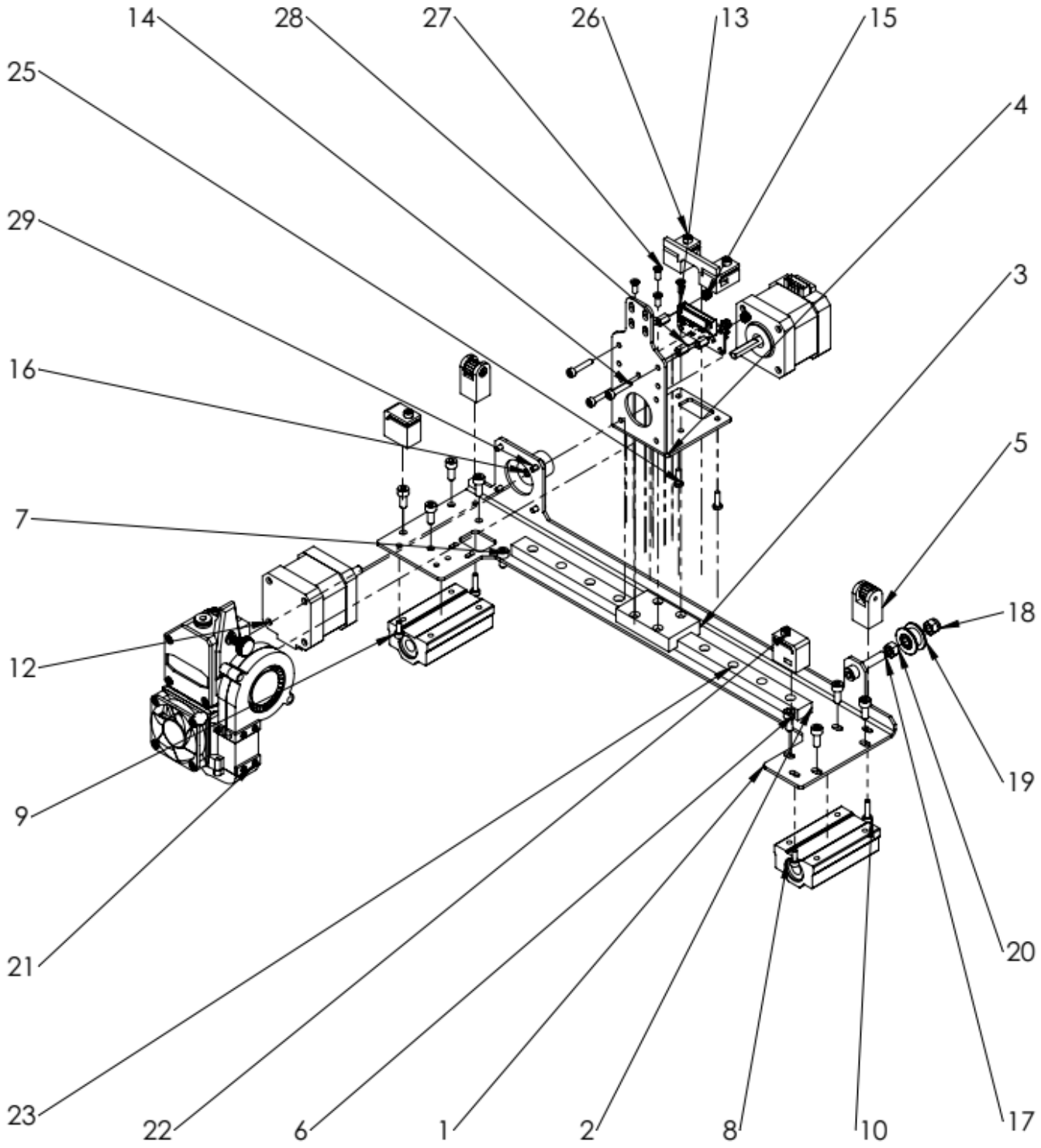
NO	PART	SIZE	QTY
1	19131 000- BODY,FRONT		1
2	19132 000-BODY, REAR		1
3	18040 000-SHAFT HOLDER, SK08		8
4	19133 000-BODY, MIDDLE		1
5	17020 010-LCD DISPLAY, TFT35, TOUCH, ASSY		1
6	19150 010-LCD BACK COVER, TFT35, 3D PRINT		1
7	17070 020- SENSOR, OPTICAL , LERDGE		1
8	12000 000-STEP MOTOR, NEMA17, 40MM		2

NO	PART	SIZE	QTY
9	15000 000-POWER SOCKET, C14, IEC 60320, FUSED		1
10	16000 000-KEY, ROUND, 20MM, 0-1, 4 PINs		1
11	21030 010-FAN, 12V, 4020		1
12	18000 000-MILE, TRAPEZE, 30CM, 8MM, THSL300-8D		1
13	13000 010-POWER SUPPLY, MEANWELL, LRS-150-12		1
14	17000 040-CONTROL BOARD, SKR V1.3		1
15	11000 000-FILAMENT SENSOR		1
16	19134 000-BODY, BOTTOM COVER, ZERO3		1
17	11010 000-FRONT WINDOW, HINGE, HANDLE, MAGNET		1
18	18120 000-SHAFT, Z AXIS, 305X8MM, ZERO3		2
19	SOCKET HEAD CAP SCREW	M4 X 10	28
20	SOCKET HEAD CAP SCREW	M5 X 16	16
21	SOCKET HEAD CAP SCREW	M3 X 16	2
22	SOCKET HEAD CAP SCREW	M3 X 10	2
23	SOCKET HEAD CAP SCREW	M3 X 8	10
24	PREVAILING TORQUE NUT	M3	18
25	SOCKET HEAD CAP SCREW	M3X30	8
26	HEX NUT	M5	20
27	COUNTERSUNK FLAT HEAD CROSS RECESS SCREW	M3 X 8	2
28	HEX NUT	M3	8
29	COUNTERSUNK FLAT HEAD CROSS RECESS SCREW	M3 X 25	1
30	COUNTERSUNK FLAT HEAD CROSS RECESS SCREW	M3 X 20	1
31	19030.030-FEET, TIRE, A-84		6
32	SOCKET HEAD CAP SCREW	M4 X 12	8
33	19160 000-RISE PART, BRASS, M3X40MM, MALE-FEMALE		4
34	11020 000-X BRIDGE ASSEMBLY, ZERO3		1
35	18140 000-SPACER, Y AXIS BUMPER, H 12MM, 3D PRINTING		2
36	18020 020-PULL, GT2, 20 TEETH		1
37	11030 000-EXTRRUDER ASSEMBLY, BMG, HOTEND, FAN, FANDUCT		1
38	18150 000-BEARING BEARING, 608, Y DRIVE		2
39	18160 000-DRIVE SHAFT, Y AXIS, ZERO3		1
40	18020 030-DROP, DOUBLE HEAD, GT2, 20 TEARS		1
41	18020 040-PULL, GT2, 20 TEETH, 8MM HOLE		1
42	11040 000-BAR LED ASSEMBLY, 25CM, COVER + CASE + LED		1
43	27020 000-PLATE LABEL, SAFETY, ALUMINUM		1
44	18150 010-BEARING BEARING, 608, Z AXIS		1
45	18010 000-COUPLING, 5-8MM		1
46	18180 000-BELT TENSIONER, Y AXIS, 3D PRINTING		2

NO	PART	SIZE	QTY
47	SOCKET HEAD CAP SCREW	M4X20	2
48	SOCKET HEAD CAP SCREW	M3X6	12
49	11050 000-Z TABLE MOUNTING, ZERO3		1
50	13000 000-POWER SUPPLY, MEANWELL, LRS-100-12		1
51	17060 000-RELAY, SSR, MGR-1D4825		1
52	17000 050-CONTROL BOARD, MKS SGEN L V2.0		1
53	HEX NUT	M4	6
54	SOCKET HEAD CAP SCREW	M3 X 25	2
55	SOCKET HEAD CAP SCREW	M3 X 12	2
56	18120 010-SHAFT, Y AXIS, 325X8MM, ZERO3		2
57	SOCKET HEAD CAP SCREW	M3 X 12	4
58	19060 000-FILAMENT HANGER		1
59	PAN HEAD CROSS RECESS SCREW	M6X20	1
60	PREVAILING TORQUE NUT	M4	2
61	17080 020-RISE PART, NYLON, M3X15MM, FEMALE-FEMALE		4
62	17080 000-UPGRADE PART, NYLON, M3X7MM, FEMALE-FEMALE		2
63	24010 000-HOSE, TEFLON, 4X2MM		1

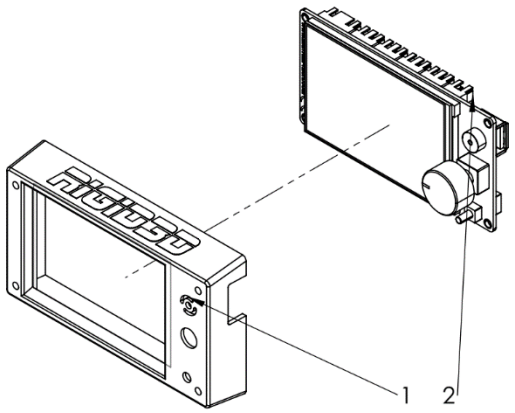


NO	PART	SIZE	QTY
1	19040 020-WINDSHIELD, PLEXY, 4MM, ZERO3		1
2	19090 000-HANDLE, WINDSCREEN, ZERO3, INVENTOR2		1
3	19020 000-HINGE, LEAF, 30X40MM		2
4	COUNTERSUNK FLAT HEAD CROSS RECESS SCREW	M3x16	2
5	HEX NUT	M3	2
6	HEX NUT	M5	2

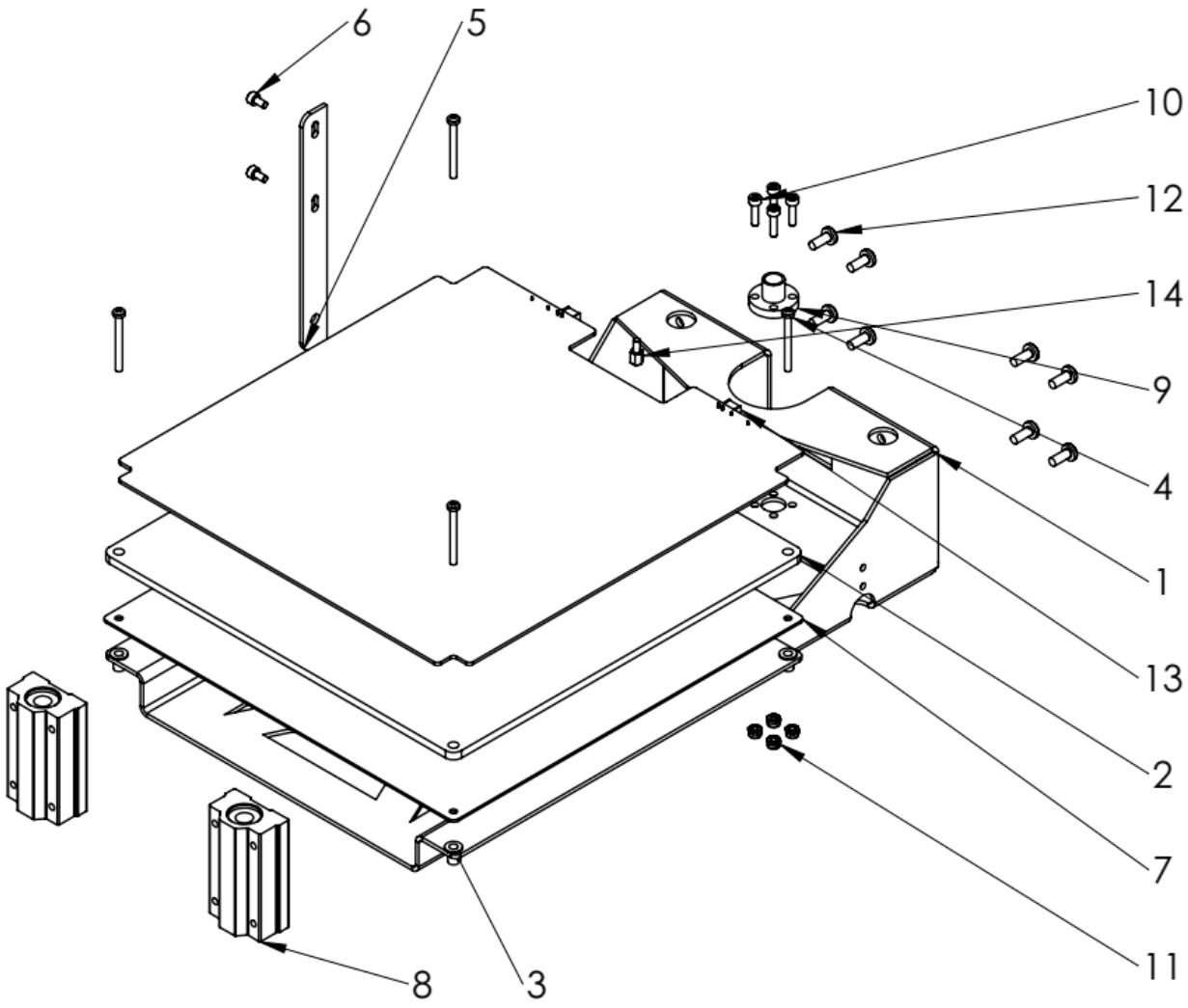


NO	PART	SIZE	QTY
1	19135 000-BODY, X BRIDGE, ZERO3		1
2	18090 010-LINEAR RAIL, MGN12, 250MM		1
3	18095 000-LINEAR CAR, MGN12H		1
4	19136 000-BODY, X CAR, ZERO3, INVENTOR2		1
5	18130 000-STRAP LOCK, CAMERA, H 15.5MM, 3D PRINTING		2

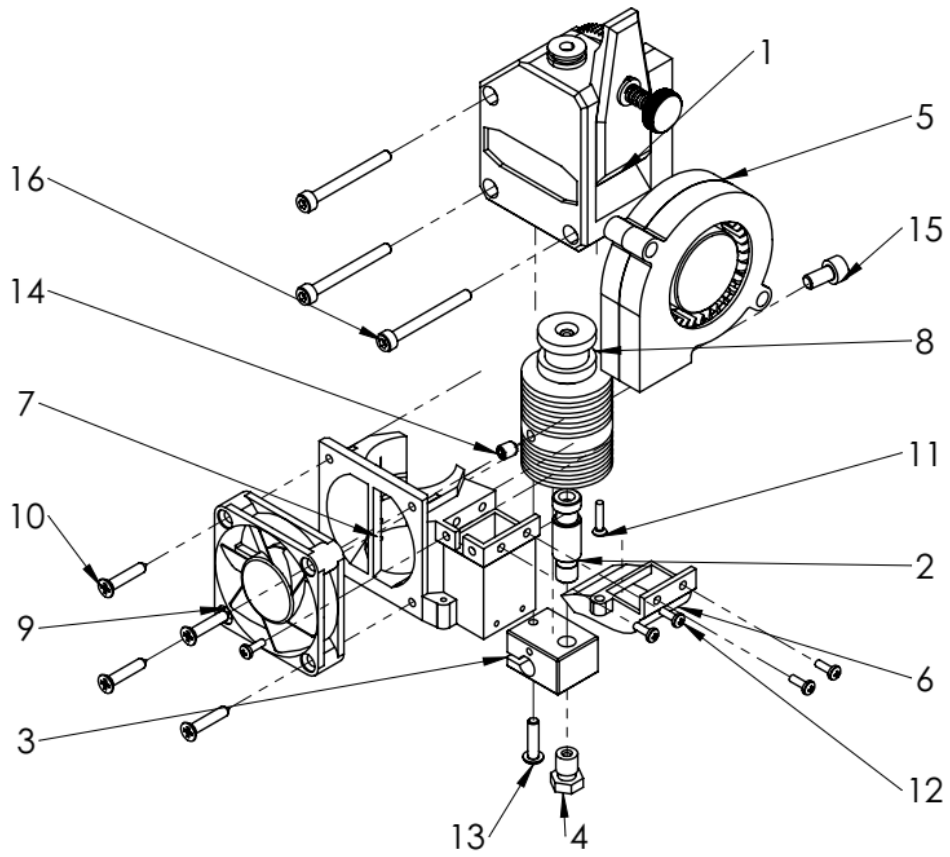
NO	PART	SIZE	QTY
6	SOCKET HEAD CAP SCREW	M4 X 10	8
7	SOCKET HEAD CAP SCREW	M4 X 8	1
8	18060 020-LINEAR BEARING, BEARING, SC08LUU		2
9	SOCKET HEAD CAP SCREW	M3 X 8	2
10	SOCKET HEAD CAP SCREW	M3 X 12	2
11	EXTRUDER GEAR		1
12	12000 000-STEP MOTOR, NEMA17, 40MM		2
13	17150 000-CARD, POWER DISTRIBUTION, GREEN		1
14	SOCKET HEAD CAP SCREW	M3 X 16	3
15	PREVAILING TORQUE NUT	M3	3
16	18020 020-PULL, GT2, 20 TEETH		1
17	SOCKET HEAD CAP SCREW	M5 X 25	1
18	PREVAILING TORQUE NUT	M5	1
19	18025 000-Idler Pulley, ID 5MM, OD 12MM, 20 TEETH		1
20	HEX NUT	M5	1
21	11030 000-EXTRUDER ASSEMBLY, BMG, HOTEND, FAN, FADUCT		1
22	18130 010-STRAP LOCK, SCREW, H 15.5MM, 3D PRINTING		2
23	COUNTERSUNK FLAT HEAD CROSS RECESS SCREW	M3 X 12	6
24	HEX NUT	M3	6
25	PAN HEAD CROSS RECESS SCREW	M3X10	2
26	18130 020-BELT LOCK, X AXIS, H 8,5MM, 3D PRINTING		1
27	STAR COUNTRY HEAD SCREW	M3X8	4
28	17080 000-UPGRADE PART, NYLON, M3X7MM, FEMALE-FEMALE		3
29	SOCKET HEAD CAP SCREW	M3X6	4



NO	PART	SIZE	QTY
1	19150 000-LCD FRAME, TFT35, 3D PRINTING		1
2	17020 010-LCD DISPLAY, TFT35, TOUCH, FRAMELESS		1



NO	PART	SIZE	QTY
1	19137 000-BODY, Z TABLE, ZERO3		1
2	1917 000-TABLE PLATE, ALUMINUM, 220X220X4MM		1
3	RIVET NUT	M3	4
4	PAN HEAD CROSS RECESS SCREW	M3X30	4
5	19138 000-BODY, BRACKET, OPTICAL SENSOR, ZERO3		1
6	SOCKET HEAD CAP SCREW	M3 X 6	2
7	19139 000-BODY, BOTTOM TABLE, ZERO3		1
8	18060 020-LINEAR BEARING, BEARING, SC08LUU		2
9	18005 000-FLANGED NUT, TRAPEZE, BRASS, 4 STARTS		1
10	SOCKET HEAD CAP SCREW	M3 X 12	4
11	PREVAILING TORQUE NUT	M3	4
12	PAN HEAD CROSS RECESS SCREW	M4 X 10	8
13	17140 000-PRINT SURFACE, PCB, 220X230MM, ZERO2-3		1
14	17180 010-TABLE THERMISTOR, SCREW, SOCKET, BRASS		1



NO	PART	SIZE	QTY
1	20090 000-BMG EXTRUDER SET		1
2	20030 000-EXTRUDER BARLEL		1
3	20050 000-EXTRUDER HEAT BLOCK		1
4	200660 000-EXTRUDER NOZZLE, E3D, 0.4MM		1
5	21050 000-FAN, BLOWER, 12V, 5015		1
6	201000 010-FAN ROUTER, BMG EXTRUDER, 3D PRINTING		1
7	20100 000-FAN HOOD, BMG EXTRUDER, 3D PRINTING		1
8	20000 020-HOTEND RADIATOR, RIGID3D, BMG CONNECTION		1
9	21030 000-FAN, 12V, 4010		1
10	COUNTERSUNK FLAT HEAD CROSS RECESS SCREW	ST2.9 X 16	4
11	COUNTERSUNK FLAT HEAD CROSS RECESS SCREW	M2 X 10	1
12	PAN HEAD CROSS RECESS SCREW	M2 X 6	5
13	SOCKET HEAD CAP SCREW	M3 X 12	1
14	SETSCREW	M4 X 5	1
15	SOCKET HEAD CAP SCREW	M4 X 8	1
16	SOCKET HEAD CAP SCREW	M3X30	3