renkforce

CE

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1. Introduction

Dear customer,

Thank you for purchasing this product.

This product complies with the statutory national and European requirements.

To maintain this status and to ensure safe operation, you as the user must observe these operating instructions!

These operating instructions are part of this product. They contain important notes on commissioning and handling. Also consider this if you pass on the product to any third party. Therefore, retain these operating instructions for reference!

If there are any technical questions, please contact:

International: www.conrad.com/contact

United Kingdom: www.conrad-electronic.co.uk/contact

2. Explanation of symbols

The lightning symbol inside a triangle is a warning to inform you of potential risks of personal injury, such as electric shock.

The symbol with the exclamation mark in the triangle is used to indicate important information in these operating instructions. Always read this information carefully.

This symbol warns of hot surfaces the contact with which may cause injury.

This symbol warns of hand injury that may occur when reaching into the device in operation.

This symbol warns of hand injury that may occur by belt drive.

Only designed for indoor use.

Read the operating instructions carefully!

The arrow symbol indicates special information and advice on operation.

3. Intended use

The 3D printer comes pre-assembled and is ready to use. It can be operated via PC using the included software or via the integrated display. The powder-coated metal housing ensures a long service life. The product prints objects up to a size of 120 x 120 x 120 mm and is equipped with a bright LED light that allows you to monitor the progress of the print. There are over 100 ready-to-print 3D models on the SD card, which can be printed out by few clicks.

The 3D printer is only approved for connection to a 100 - 240 V/AC, 50/60 Hz mains socket. It is designed only for home use.

It is intended for indoor use only. Contact with moisture, e.g. in bathrooms, must be avoided under all circumstances.

For safety and approval purposes, you must not rebuild and/or modify this product. If you use the product for purposes other than those described above, the product may be damaged. In addition, improper use can result in short circuits, fires, electric shocks or other hazards. Read the instructions carefully and store them in a safe place. Make this product available to third parties only together with its operating instructions.

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Up-to-date Operating Instructions, 3D model files, configuration files:

Download the latest operating instructions, 3D model files and configuration files at www.conrad.com/downloads or scan the QR code shown. Follow the instructions on the website.

4. Delivery content

- 3D printer fully-assembled
- 250 g Genuine Renkforce filament (1,75 mm, white)
- 8GB SD card with
  - Manual
  - "Cura" Software
  - USB driver
  - Over 100 ready-to-print 3D models
  - Configuration files
- Power cable
- Quick-Start-Guide
- Filament spool holder
- Filament tube
- USB cable
- Scraper
- Tweezers
- Side cutter
- 2.0 mm hex key
- 2.5 mm hex key
- 2x Screw
- Glass build bed pre-installed with adhesive surface
- 5 x Genuine Renkforce filament samples (wood, copper, elastic, glow in dark and thermo color - 1.75 mm - 50 g each)

5. SD card content

- The SD card contains the following main folders:

  - 3D Models

  - Config

  - Manual

  - Software

  → To view the complete SD card content, connect the 3D printer with the inserted SD card to your computer. Via the control panel, you will have limited access to the SD card.

a) 3D Models

- The folder "3D Models" contains several subfolders with "Basic shape", "Capital letters (A-Z)", "Constellation", "Mathematical symbols", "Numbers", "VariousObjects" etc.

- There are over 100 ready-to-print 3D models available.

- Each model is available in .gcode, .jpg, .stl format. For example "RF100":

RF100.gcode   RF100.jpg   RF100.stl
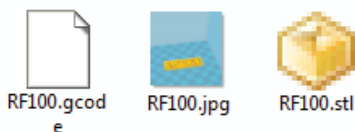
- JPG is a preview of the model.

  With STL you can create your own GCODE by using "Cura" software.

  Use GCODE for printing.

- Insert the SD card into the SD card slot or read the .stl file into "Cura" to get ready for printing.

  → On the control panel only the .gcode files are listed.

b) Config

- The folder "Config" contains configuration files for different filament materials:

  - "Copper"

  - "Elastic"

  - "PLA"

  - "Wood"

- Load the configuration file to "Cura" for printing an object with chosen filament material (for details, refer to "f) Load configuration file – Windows®" on page 38).

  → The content of this folder cannot be reviewed on the control panel. These configuration files are recommended for the supplied filaments. You can also create your own configuration settings by using "Cura" software.

c) Manual

• The folder "Manual" contains the Quick-Start-Guide.

⟶ The content of this folder cannot be reviewed on the control panel.

d) Software

• The folder "Software" contains the "Cura" software in form of an executable (.exe) for Windows® and a disk image (.dmg) for Mac OS, as well as the USB driver.

⟶ The content of this folder cannot be reviewed on the control panel.

6. Features and functions

• 3D printer completely assembled and ready to use

• Max. printed object size: 120 x 120 x 120 mm

• Highly precise extruder with 0.4 mm printing nozzle

• LC display with control knob for device operation right at the device

• Operation via computer (USB) or stand-alone operation with SD card

• Support printing from SD card and PC

• Manual adjustment of the printing parameters possible even during operation

• Extremely stable due to metal construction

• Suitable for 1.75 mm filaments of the type PLA, wood, copper, elastic, glow in dark and thermo color

• Over 100 ready-to-print 3D models

• "Cura" software included

7. Working principle of the 3D printer

- For 3D print, you need a file, which contains the three-dimensional data of the object to be printed (a common format of such a file is, e.g., STL).

- This file can be produced with the corresponding software or with a 3D-scanner. There are also many printing files already online that can be downloaded to print an object as quickly as possible.

- The actual printer software has the task to render the above three-dimensional file into a file that the printer can print. This is a file in which the individual print layers, the print temperatures for nozzle etc. are specified. The file has the extension ".gcode".

- This GCODE printing file is sent to the 3D printer either via the USB interface by the computer, or saved on SD card, inserted into SD card slot of the 3D printer for standalone operation.

- The 3D printer creates the object layer by layer (Fused filament fabrication procedure), the filament material is transported from the filament spool to the nozzle.

- In the extruder, the filament material is melted and then applied to the build bed via a fine nozzle layer by layer.

- The build bed moves in the Z (upwards/downwards) direction, the extruder moves in the X (left/right) and Y (forwards/backwards) directions. Thus, all prerequisites to produce a threedimensional object by horizontal application of the present layers are created.

A 3D printer is a highly complex device in which many parameters must be set depending on the printer, printed object and filament material used.

Additionally, the adhesion of the printed object on the build bed is influenced by printing temperature, filament material, build bed calibration, shape / size of the printed object and surface properties of the build bed.

Ambience influences such as drafts, grease on the build bed, etc. also play a role in the quality and adhesion of the printed object.

For the above reasons, it is not possible to reach high-quality print results at once and without previous experiments.

Change the adjustable parameters in small steps for the best printing results for your application. The printing examples enclosed on the SD card provide references, but must be refined for perfect results depending on the above parameters.

8. Safety instructions

Read the operating instructions carefully and especially observe the safety information. If you do not follow the safety instructions and information on proper handling in this manual, we assume no liability for any resulting personal injury or damage to property. Such cases will invalidate the warranty/guarantee.

a) General information

- All persons who operate this product, mount, install, assemble it, put it into operation or service it must be trained and qualified accordingly and must observe these operating instructions.

- This product is not a toy and not suitable for children. Children cannot judge the dangers involved when handling electrical devices.

- The 3D printer is not suitable for persons with physical, sensor or metal limitations or for inexperienced or uninformed persons.

- Do not leave packaging material lying around carelessly. This may become dangerous playing material for children.

- Protect the device from extreme temperatures, direct sunlight, strong jolts, vibrations, flammable gases, steam, dust and solvent, high humidity, high moisture, such as rain or steam or strong mechanical strain.

- The mechanical parts of the product are produced highly precisely. Never apply any mechanical force here. The 3D printer may be rendered useless by this.

- If it is no longer possible to operate the product safely, take it out of operation and protect it from any accidental use. Safe operation can no longer be guaranteed if the product:

  - is visibly damaged,

  - is no longer working properly,

  - has been stored for extended periods in poor ambient conditions or

  - has been subjected to any serious transport-related stresses.

- Please handle the product carefully. Jolts, impacts or a fall even from a low height can damage the product.

- The device may not be used in the vicinity of bathtubs, showers, swimming pools or sinks. The product may not become wet.

- Only operate the device in moderate climates, never in tropical climates.

- Some parts of the device can become very hot and may cause burns. Exercise caution when children and vulnerable people are present.

- Never reach into the 3D printer in operation. The mechanically moved parts within the printer pose a high risk of injury!

- Do not place any objects on the product; to prevent overheating, do not cover the product while it is in operation.

- The nozzle grows very hot during operation. Do not touch it during or just after operation directly with bare hands. Let it cool down sufficiently first.

- Do not move the product during operation. Turn off the product before moving, transporting or storing it.

- Never use the 3D printer outdoors.

- Never place containers containing liquids, e.g. glasses, vases, etc. on the device or in its vicinity and do not pour any liquids out over the device. Liquids may get into the housing and impair electrical safety. This also poses great danger of fire or potentially fatal electric shock!

  If this is the case, first power down the respective mains socket on all poles (e.g. switch off circuit breaker and FI switch) and then pull the mains cable from the socket. Disconnect all lines from the device. Do not operate any part of the product anymore afterwards, but take it to a specialist workshop.

- Never place any sources of open fire, such as lit candles, on or right next to the device.

- Never connect the mains plug to a mains socket immediately after the device has been taken from a cold to a warm environment. The resulting condensation may destroy the device. Allow the device to reach room temperature before connecting it. Wait until the condensation has evaporated.

- Do not cover the openings on the bottom of the product. Do not insert any sharp objects into the product as this may cause an electric shock!

- Do not operate the product unattended.

- Under no circumstances should you service any of the components in the interior of the 3D printer therefore never disassemble the motor unit.

- When setting up the 3D printer, observe that the mains switch at the rear of the device must be easy to reach so that the device can be switched off quickly and easily in case of malfunction.

- In operation, there will be noise and, depending on the filament material used, smells. Observe this when selecting the site of setup and the filament material. Ensure sufficient ventilation or install an extraction system. Do not inhale arising vapours. When using any other than the recommended filament material, poisonous vapours or gases may develop.

- Observe the additional safety information in the individual chapters of these instructions.

- For safety reasons, any unauthorized conversions and/or modifications to the product deviating from these operating instructions are not permitted. Components may be damaged and thus impair the function or safety of the device.

- Consult an expert when in doubt about the operation, safety or connection of the device.

- Maintenance, modifications and repairs are to be performed exclusively by an expert or at a qualified shop.

- If you have questions which remain unanswered by these operating instructions, contact our technical support service or other technical personnel.

b) Connecting the mains

- This device is a safety class 1 product. The only permissible voltage source is a properly grounded mains socket (100 – 240 V/AC, 50/60 Hz) of the public mains.

- Before connecting the 3D printer to the mains, make sure that your local AC mains voltage matches the specifications on the nameplate (on the back of the 3D printer).

- Never touch the mains line or the mains plug with wet or damp hands. There is a risk of potentially fatal electric shock!

- Do not let the power cable hang over the edge of tables or other surfaces on which the 3D printer is standing.

- Completely unwind the power cable before use. A power cable that is not completely unwound can lead to overheating and constitutes a fire hazard!

- The mains outlet must be located near to the device and be easily accessible.

- Never unplug the mains plug from the socket by pulling on the cable. Always use the grips on the sides of the plug.

- Unplug the mains plug from the mains socket if you do not intend to use the 3D printer for a prolonged period of time.

- For safety reasons, unplug the mains plug from the mains socket during thunderstorms.

- Unplug the mains plug from the mains socket after use.

- Always unplug the product when it is unattended.

- Unplug the product from the mains and computer before maintenance work or modification and let it cool down.

- Make sure that the power cable is not squeezed, bent, damaged by sharp edges or put under mechanical stress. Avoid excessive thermal stress on the power cable from extreme heat or cold. Do not modify the power cable. Otherwise the power cable may be damaged. A damaged power cable can cause a deadly electric shock.

- Do not touch the power cable if it is damaged. First, power down the respective mains socket (e.g. via the respective circuit breaker) and then carefully pull the mains plug from the mains socket. Never use the product if the power cable is damaged.
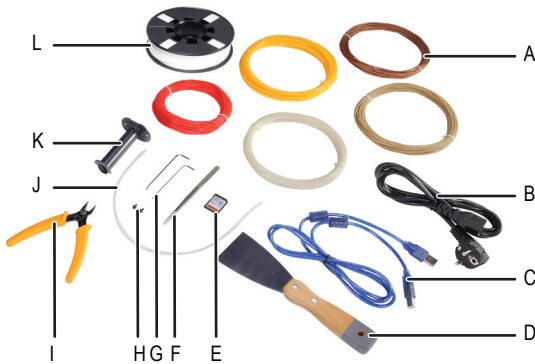
9. Operating elements and parts

a) Printer (front and back)
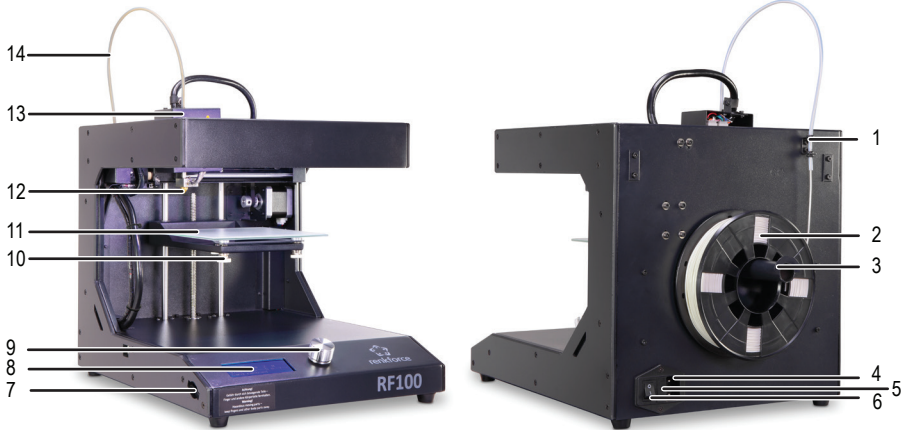
1	Filament tube holder	6	Power switch	11	Build bed
2	Filament with spool	7	SD card slot	12	Nozzle
3	Filament spool holder	8	LC display	13	Extruder
4	Power supply socket	9	Control knob	14	Filament tube
5	Fuse compartment	10	Bed leveling screws (3 in total)		

b) Accessories

A   5x Genuine Renkforce filament samples

B   Power cable

C   USB cable

D   Scraper

E   SD card

F   Tweezers

G   2 / 2,5 mm hex keys

H   2x Screws

I   Side Cutter

J   Filament tube

K   Filament spool holder

L   Genuine Renkforce PLA filament with spool

10. Before installation

• Remove all the components carefully from the packaging.

• Remove protection foils from LC display and the housing.

• Cut the cable ties on each side with the side cutter.

• Check that no parts are missing or damaged. Do not use the device if any parts are missing or damaged.

11. Installation

a) Set up 3D printer

⚠ When setting up the 3D printer, observe that the power switch must be easy to reach so that the device can be switched off quickly and easily in case of malfunction.

Ensure proper ventilation when setting up the device. Do not put the device down on soft supports such as a carpet or bed, etc. the air circulation also must not be impaired by other objects. This prevents heat dissipation from the product and may lead to overheating (danger of fire).

Make sure that the device has a stable footing and place it on a stable underground. Persons may be injured if the 3D printer drops.

Ensure that the power and USB cables are neither pinched nor damaged by sharp edges.

Always place cables so that no one can trip over them or be caught in them. There is a danger of injury.

• Place the 3D printer on a dry, flat, non-vibration-sensitive and stable surface.

There are anti-slip feet on the bottom of the device. If necessary, place a protective mat underneath the device in order to protect the surface of the worktop.

b) Installation and connection

⚡ **The mains outlet must be located near to the device and be easily accessible, so that in case of an error, the device can be quickly separated from the mains voltage.**

Be careful when handling power cable and mains connections. Mains voltage may cause potentially fatal electrical shock.

Before plugging in the mains plug, ensure that the device voltage indicated at the 3D printer corresponds to the available mains voltage. Do not connect the device if the indication does not correspond to the available mains voltage. Incorrect supply voltage may lead to irreparable damage to the device and danger to the user.
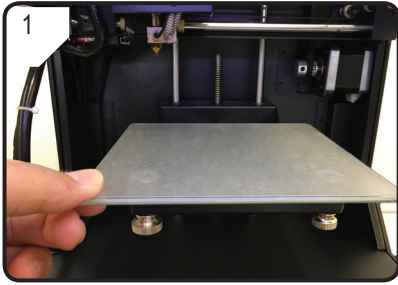
• Place the build bed.
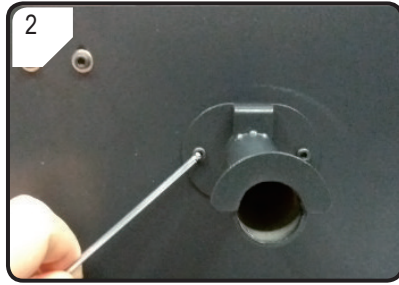
• Use two screws and the hex key to install filament spool holder at the back of the 3D printer.

The 'nose' at the end of the holder faces upwards.
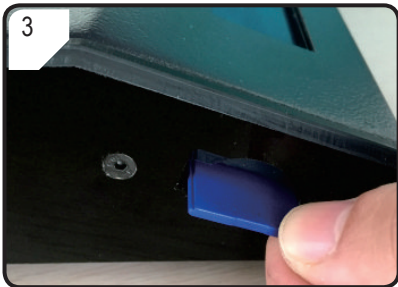
• Insert SD card with sticker facing downwards.

• Connect the power cable with the power supply socket.

• Fully unwind the power cable and insert the mains plug into a wall-mounted socket.

• Switch the 3D printer on by moving the power switch to the **I** position.

• The printing area is lit up.

• < Info screen > appears on the LCD display. It indicates that the 3D printer is now ready to use.

12. Control panel

- The 3D printer is operated by the control knob.
- The LC display shows the menu options and the operation status via an < Info screen >.

a) Initial operation

Description	Action
Navigate in the menu structure	Rotate the control knob anticlockwise / clockwise.
Adjust the parameter	
Select / enter the menu	
Confirm a menu option / parameter	Press the control knob.
Return to previous menu	

b) Menu options and functions

Following refers to the Printer Firmware V2.1 and functions may change with updated versions.

Menu option	Function
< Info screen >	< Info screen > is shown after switching on the 3D printer and during printing. For details, refer to section „c) < Info screen >" on page 18.
< Main > menu (during standby mode)	
< Info screen >	Return to < Info screen >.
< Prepare >	Enter the < Prepare > menu.
< Print from SD >	SD card has been detected sucessfully. Enter the "SD Card" menu.
< No SD card >	SD card has been not detected sucessfully.
< About >	Enter the < About > menu to check information regarding the firmware version.
< Prepare > menu (during standby mode)	
< Main >	Return to < Main > menu.
< Auto home >	The build bed moves to zero (z = 0) along the z-axis and the nozzle to the home position (x,y) = (0,120).
< Level bed >	Enter < Level bed > menu.

Menu option	Function
< Preheat PLA >	Confirm this menu option and the nozzle starts heating up to the default temperature of 220°C.
	⟶ If there is no action during the following 5 minutes, heating will be turned off and the nozzle will be cooled down to prevent filament overheating and blockage of nozzle.
< Load filament >	Select this function to load filament into the extruder.
	The 3D printer will draw 80 mm of filament into the extruder.
	Nozzle temperature must be higher than 170°C.
< Unload filament >	Select this function to unload filament from extruder.
	The 3D printer will draw 10 mm of filament into the extruder, afterwards 80 mm out of the extruder.
	Nozzle temperature must be higher than 170°C.
< Move axis >	Enter the < Move axis > menu.
< Disable steppers >	Switch off all motors. Extruder and build bed can be moved along X , Y, Z axis by hand.
< Temperature >	Enter the < Temperature > menu.
< SD card > menu	For details, refer to chapter "5. SD card content" on page 6.
< Level bed > menu	
< Prepare >	Return to < Prepare > menu.
< First point >	Adjust first point for build bed calibration. Extruder goes to first calibration point.
< Second point >	Adjust second point for build bed calibration. Extruder goes to second calibration point.
< Third point >	Adjust third point for build bed calibration. Extruder goes to third calibration point.
< Move axis > menu	
< Prepare >	Return to < Prepare > menu.
< Move 10mm >	Adjust the knob sensivity: 10 mm movement per 1 increment.
	Enter the < Move > menu to select the X- and Y- axis movement.
< Move 1mm >	Adjust the knob sensivity: 1 mm movement per 1 increment.
	Enter the < Move > menu to select the X-, Y- and Z- axis movement.
< Move 0.1mm >	Adjust the knob sensivity: 0.1 mm movement per 1 increment.
	Enter the < Move > menu to select the X-, Y- and Z- axis movement.
< Move > menu	
< Move axis >	Return to < Move axis > menu
< Move X >	Select X- Axis movement and enter the < Move X > menu to adjust the X-axis movement in the range 0 to +120 mm.
	The extruder moves to left/right along the X-axis.

Menu option	Function
< Move Y >	Select Y- Axis movement and enter the < Move Y> menu to adjust the Y-axis movement in the range +120 to 0 mm.
	The extruder moves forwards/backwards along the Y axis (*backwards: toward to control panel).
< Move Z >	Select Z- Axis movement and enter the < Move Z > menu to adjust the Z-axis movement in the range 0 to +120 mm.
	The extruder moves up/down along Z axis.
	This option is not available, when < Move 10MM > has been selected.
< Temperature > menu	
< Prepare >	Return to < Prepare > menu.
< Nozzle >	Adjust temperature of nozzle between the range of 0 to 260 °C.
	⚠ Do not keep nozzle temperature at 260 °C for more than 10 minutes. After 10 minutes, decrease it to 230 °C and keep it at this temperature for at least 10 minutes before increasing it again. If you consistently operate the 3D printer at temperatures over 230 °C, the life time of the extruder will drastically be shortened.
< About > menu	
< Version >	Check the version number of the firmware.
< Main > menu (during printing)	
< Info screen >	Return to < Info screen >.
< Tune >	A list of parameters for control of the print speed, nozzle temperature, fan speed and flow rate of filament during printing.
< Pause print >	Pause or interrupt printing (only available when print from SD card).
< Resume print >	Continue printing after printing has been paused or interrupted.
< Stop print >	Stop printing. The nozzle returns to home position and the build bed moves down. Nozzle starts cooling down (only available when print from SD card).
	Stopping may take several seconds.
< Emergency stop >	Terminate any tasks immediately.
	Axis movement and extrusion of filament stops. The 3D printer does not accept any input and the < Info screen > will be not updated. Afterwards 3D printer needs to be restarted (for details refer to "f) Restart the 3D printer" on page 27).
< Tune > Menu	
< Speed >	Adjust print speed between the range of 10 to 300 %. Default setting is 100 %.
	→ Print speed is set by "Cura" when generating the GCODE. The speed option sets a percentage of that speed (e.g. 150%). For best print results, we recommend to set the desired speed directly in "Cura".
< Nozzle >	Adjust nozzle temperature between the range of 0 to 260 °C. Default setting is 220 °C.

Menu option	Function
< Fan speed >	Adjust fan speed between the range of 0 to 255 RPM. Default setting is 255 RPM.
	When nozzle temperature reaches 40°C, the fan will be automatically switched ON at default setting 255 RPM.
< Flow >	Adjust extruder filament feeding speed between the range of 10 to 300 %. Default setting is 100%.
	Feeding speed depends on print speed.
	If the flow rate is too high, the nozzle may be clogged.

c) < Info screen >
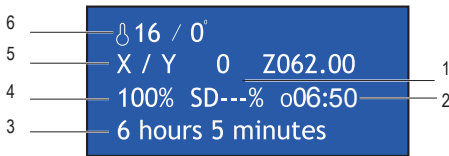
1   % of printing process

2   Working time counting from print task start

3   3D printer status information

4   Print speed (can be adjusted by control knob)

5   Current position X-, Y-, Z- axis

6   Current temperature / target temperature

The info screen informs you about different statuses:

Status information	Situation
"3D printer ready ..."	3D printer is ready to use.
"Heating"	Heating is in process.
"Heating done"	Heating process is finished.
"Printing .. "	Printing is in process.
"Printing aborted"	Printing has been terminated.
"Restart printer"	Malfunction of the 3D printer.
"6hours 5 minutes"	Total printing time, for example here the model file needs in total 6hours and 5 minutes to be printed.
"Temp sensor error"	Malfunction of the thermistor (please refer to „18. Troubleshooting" on page 44).

18

13. General notes on 3D printing

⚠ During printing, never cut off the power supply, unplug the USB cable or remove the SD card.

- The print quality of 3D printers depends on many factors. The most important ones are:

  - print speed

  - layer thickness

  - build bed calibration

  - temperature

  - flow

  - filament material

  - 3D model structure

- It is not always possible to achieve a satisfactory print result at the first attempt. Adjustments and fine tuning are necessary to improve print quality.

- Every material requires different print settings.

- Avoid overhangs greater than 45 °. If necessary, use the support structure option in "Cura" and remove supports after printing.

a) Nozzle temperature

- The best nozzle temperature depends on the filament material as well as the printer layer thickness. The printing temperature of the filament varies depending on filament material and filament manufacturer. Always check the specification of the filament before printing. For best results it is recommended to use genuine Renkforce filament.

- Perform the first test prints at the default temperature.

- To optimize the print quality, print the same object with the same printing layer thickness but different nozzle temperatures. Select temperatures each different by 5 °C from the previous one. Compare the results.

  This way you can find suitable nozzle temperatures for different filaments and printing layer thicknesses more easily.

- If the nozzle temperature is set too hot, the material cannot cool off quickly enough and will melt the layer below again.

- If the nozzle temperature is too low, the filament does not melt properly and the filament flow is non-homogeneous. For these reasons, the individual layers do not melt together sufficiently.

b) Prevent nozzle clogging

- Do not leave the nozzle at a high temperature for a long time without printing.

- Keep the nozzle at least 20 mm away from the build bed during loading of filament.

- Unload the filament after use.

c) Print layer thickness

- The print layer thickness determines the height of the individual print layers and thus the resolution and quality of the printed object.

- The thinner the printed layers, the better the print quality and the longer the print duration.

- The thicker the printed layers, the lower the print quality and the shorter the print duration.

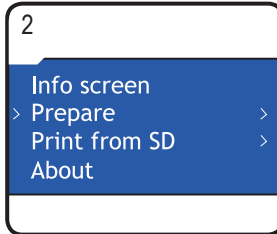→ Experiment with the above parameters to find satisfying print results depending on the material used.

For the first print attempts, use the PLA filament. Since it is a material that can be mastered easily as it does not shrink while cooling down and adheres very well to the build bed.

14. Preparation

a) Calibrate build bed

1

A 25/0°
X 0 Y 0 Z 0.8
%100% SD---% ⊕--:--
3D Printer ready.

- Press the control knob in < Info screen > to enter < Main Page >.

2

> Info screen
> Prepare   >
  Print from SD   >
  About

- In < Main > menu select < Prepare > .

3

> Auto home
  Level Bed   >
  Preheat PLA
  Load filament

- Select < Auto home >.

4
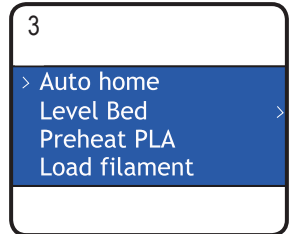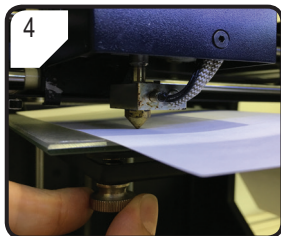
- Adjust 3 screws under build bed to adjust the gap between build bed and nozzle until built plate is lying flat.

- Gap distance should be between 0.1 and 0.3 mm (i.e. use A4 paper as a measurement tool). Nozzle must not touch build plate!

5

⬆ Prepare   ⬆
  First point
  Second point
  Third point
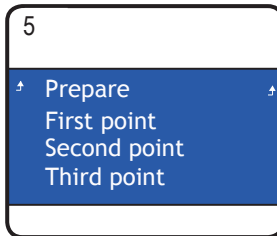
- Return to < Prepare > menu.

- Enter < Level bed > menu and select < First point >.

- Ensure during build bed adjustment, that the distance between nozzle and build bed should be same each time. Otherwise build bed is uneven and print objects may not adhere to it properly.

6
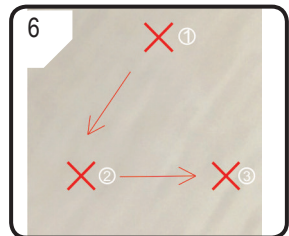
- Repeat STEPS 1-4 for second and third points (calibration sequence and movement path of nozzle are shown).

• If the printer does not print properly after the build bed calibration, following steps are needed:

7

Move axis >
> Disable steppers
Temperature >

8

9

CLICK!
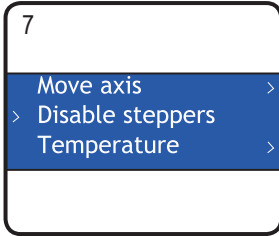
• First select < Auto home > in < Prepare > menu, then select < Disable steppers > to unlock motor.

• Adjust a 5 mm distance between nozzle and build bed by turning the thread (Z-axis) anticlockwise by hand.

• Gently turn the thread (Z-axis) clockwise ...
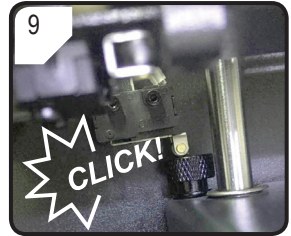
• ... until there is a "click" sound at the upper left part of the build bed.

• Calibrate the build bed, by repeating step 1 to 6 in section "a) Calibrate build bed" on page 21.

b) Set up filament

1

2

3
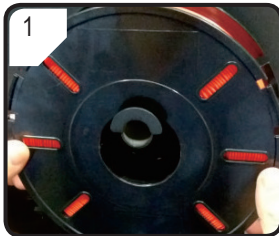
• Put the filament on the filament spool holder.
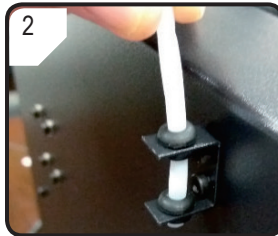
• Install filament tube into the filament tube holder.
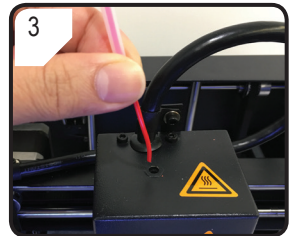
• Feed filament through filament tube until approx. 5 cm are visible on the extruder end.

c) Load filament

1

> Unload filament
> › Move axis
> Disable steppers
> Temperature ›
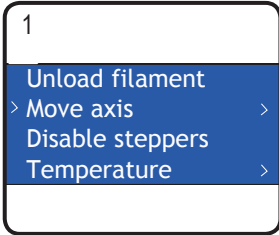
• In < Prepare > menu, select first < Auto Home >, then < Move axis >.

2

> ⬆ Prepare ⬆
> Move 10mm ›
> › Move 1mm ›
> Move 0.1mm ›

• Select < Move 1mm > .

3

> ⬆ Move axis ⬆
> Move X
> Move Y
> › Move Z

• Select < Move Z >.

4

> z: +020.0
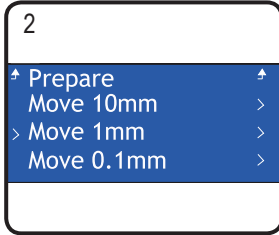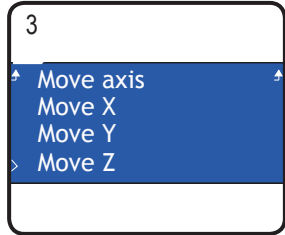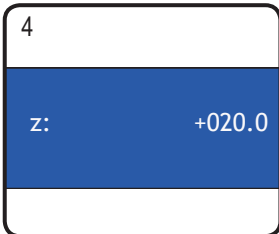
• Adjust the Z-axis to minimum + 20.0 mm.

5
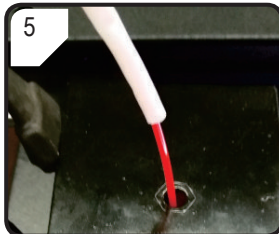
• Insert the filament into the hole of the extruder.

6

> ⬆ Main
> Auto home
> Level Bed ›
> › Preheat PLA
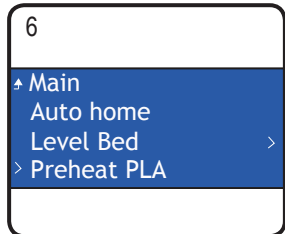
• Select < Preheat PLA > under the < Prepare > menu.

7

> Auto home
> Level Bed ›
> Preheat PLA
> › Load filament
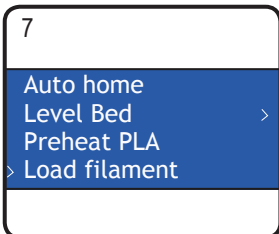
• When the current temperature has reached the target temperature (at least 170 °C), select < Load filament >.

8
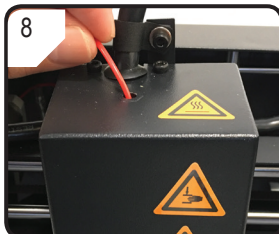
• Gently push and guide the filament into extruder until it exits from the nozzle.
• Feel the filament slowly getting drawn into the extruder.

→ If no filament exits from the nozzle after filament movement stopped, select < Load filament > again. After filament is loaded, filament residue can be removed with the tweezers.

d) Change / Replace filament

- Change the filament, if you want to switch to another filament color or material.

- Replace the filament, if the existing filament is used up and a new filament shall be used.

- Before changing or replacing filament, the extruder must be heated so that the old filament can be cleanly replaced from the extruder.

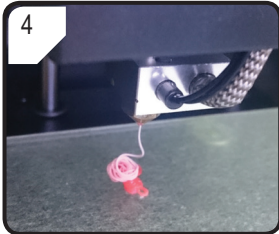⚠️ Do not touch the hot extruder nozzle. Danger of burns!
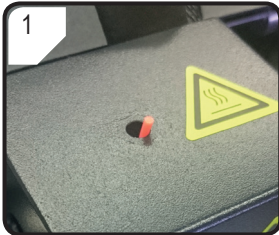
- Cut the existing filament in the extruder.
- Remove the filament spool from the filament spool holder.
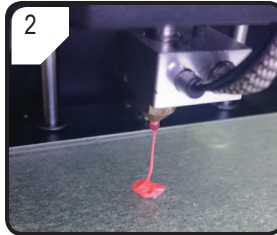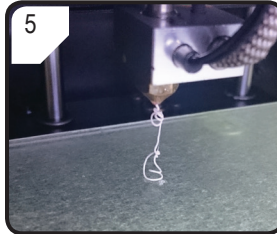

- Select < Preheat PLA >.
- Remaining filament is extruded.

- Place the new filament onto the filament spool holder.
- Feed the new filament into the extruder.

- Select < Load filament >.
- Let the new filament extrude ...

- ... until the residue of the old filament has been completely removed from the extruder. It can be recognised by the colour change.

e) Install "Cura" software (optional)

For details, please refer to chapter "16. Print from "Cura" software" on page 27.

15. Print from SD card

⚠ When heating, there may be slight development of smoke or steam. This is normal. Please ensure the corresponding ventilation.

Do not apply any mechanical force on the build bed. Danger of build bed breakage.

• Printing directly from the SD card can be performed only via the control panel. It does not require installation of the software. The 3D printer must be disconnected from the PC. If connected, please unplug the USB cable.
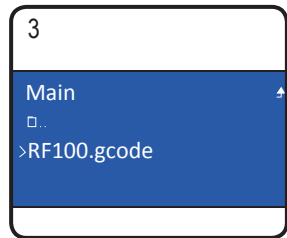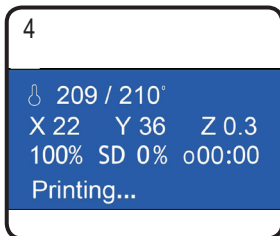
a) Start printing

1
Info screen
Prepare >
> Print from SD >
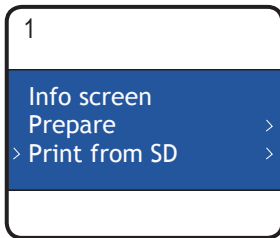
• Press the control knob and select < Print from SD > in < Main > menu.

2
Software ☐
Manual ☐
Config ☐
>3D Model ☐
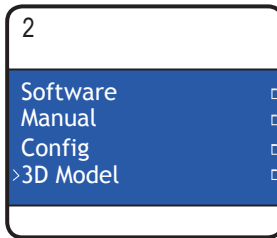
• Navigate in the menu and select < 3D Model >.

3
Main ▲
☐..
>RF100.gcode

• Select a printable model for example < RF100.gcode >.

• Please note that only files in .gcode format is shown in the menu.

4
♨ 209 / 210˚
X 22   Y 36   Z 0.3
100% SD 0% ○00:00
Printing...

• The < Info screen > appears on the LC display.

• The build bed moves to zero along the Z-axis. The nozzle moves to the home position and starts heating.

• When the nozzle reaches the target temperature, the printing starts.

5

• After printing is done, let the printed object cool down for a few minutes.

• Take out the build bed. Remove the printed object carefully with the scraper.

• Calibrate the build bed again.

b) Pause printing

⚠️ While printing is paused, the nozzle continues to heat. Therefore, pause the print only for a short period, otherwise the nozzle will overheat and may become clogged.

• Press the control knob to leave the < Info screen > and enter the < Main > menu.

• Select < Pause print > to pause printing.

• To continue printing, select < Resume print >.

c) Adjust parameters during printing

⚠️ **Recommended for advanced users only.**

• Press the control knob to leave the < Info screen > and enter the < Main > menu.

• Enter < Tune > menu to adjust print speed, nozzle temperature, fan speed and extruder fillament feeding speed.

⚠️ **Print speed:** Observe the printing and adjust the print speed. The print speed may influence the print quality against different print object and different filament for example if the print speed is too high, the printing object may not adhere to the build bed.

Nozzle temperature: Do not keep nozzle temperature at 260 °C for more than 10 minutes. After 10 minutes, decrease it to 230 °C and keep it at this temperature for at least 10 minutes before increasing it again. If you consistently operate the 3D printer at temperatures over 230 °C, the life time of the extruder will drastically be shortened.

Fan Speed: Please pay attention when fan speed is set to 0 RPM during nozzle heating, as this may cause clogging of the nozzle.

Flow (extruder fillament feeding speed): Observe the printing and adjust the speed. If the speed is too high, the nozzle may become clogged.

→ The parameter "print speed" can be also adjusted by rotating the control knob during the printing process.

d) Stop printing

• Press the control knob to leave the < Info screen > and enter the < Main > menu.

• Select < Stop print > to stop printing. It may take several seconds for the 3D printer to stop completely.

• The nozzle returns to home position and the build bed moves down. Nozzle starts cooling down.

e) Perform < Emergency stop >

• Select < Emergencey Stop > at the control knob to terminate any running tasks immediately.

  All axis movement and extrusion of filament will be stopped. The 3D printer does not accept any input, the < Info screen > stops updating.

• Restart the 3D printer (for details refer to "f) Restart the 3D printer" on page 27).

f) Restart the 3D printer

• Restart the 3D printer,

  - when LC display does not show any correct information or the LC display is empty.

  - after an < Emergency stop > has been perfomed.

  - when the 3D printer is not working properly.

• If any, unplug the connected USB cable.

• Switch off the 3D printer. After a short while, switch it on again and operate the 3D printer as usual.

16. Print from "Cura" software

a) General notes

• The 3D printer is compatible with the "Cura" software package and is available for Windows® and Mac OS. For specific operating system and hardware requirements refer to the website at https://ultimaker.com/ and make sure your computer meets the minimum requirements.

• It is unfortunately not possible to explain all the functions of the enclosed software in the scope of these operating instructions. Full instructions are available from https://ultimaker.com/.

• The basic operation and the path to the first printout are, however, described below so that you can get a result quickly and easily. To further facilitate this, we have collected some printer and material-specific configuration files for the software which you can find on the supplied SD card.

• "Cura" is a high-performance software solution for 3D printing that is easy to operate even for beginners.

  ⟶ The enclosed SD card includes a version of the software for Windows® and Mac OS which works with the 3D printer. We recommend you install this version since it requires no special configuration. The required drivers (for Windows®) are also provided on the SD card.

• The software "Cura" performs the following tasks:

  - Placing, rotating and scaling of 3D objects.

  - Slicing of the object to be printed into thin layers that the 3D printer can print out layer by layer. The result of this process is a GCODE file

  - Reviewing GCODE files for error and printability

  - Generating support structures and rafts for improving print results

  - Sending the GCODE files to the printer or saving them on an SD card for standalone printing

  - Setting and storage of printer and filament-specific data

  - Managing the printer and filament profiles

b) Installation

- Install the file "Cura_15.04.6.exe" (for Windows®) or "Cura-15.04.6-MacOS.dmg" (for Mac OS) from the directory "Software" from the SD card.

- Follow the on-screen instructions during the installation process. For details, refer to instructions provided on https://ultimaker.com/.
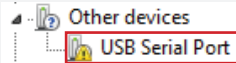
c) Setup of the Software - Windows®

Connect to the 3D printer

- Connect the 3D printer to a free USB port on your computer with the help of the supplied USB cable. Switch the printer on.

⟶ When the printer is connected to the computer, ensure the printer remains switched on at all times.

- When connecting printer and computer for the first time, the operating system recognizes the new hardware and searches for suitable drivers.

⟶ If a suitable driver is not available, you can manually install the necessary drivers. Do the following:

1	Open PC device Manager. A new device is recognized under "Other devices" (or Ports COM & LPT).	
2	Right click on the "USB Serial Port", and then select "Update Driver Software...".	
3	Click on "Browse my computer for driver software." The required driver is available on the SD card "Software/ft232 usb uart driver".	
4	Follow the on-screen instructions to finalize the updating process.	

Start the software

After installation, the "Configuration Wizard", which will guide you through the set up process of the 3D printer, appears:

1 Select your preferred language (e.g. English). 2 Click "Next >".
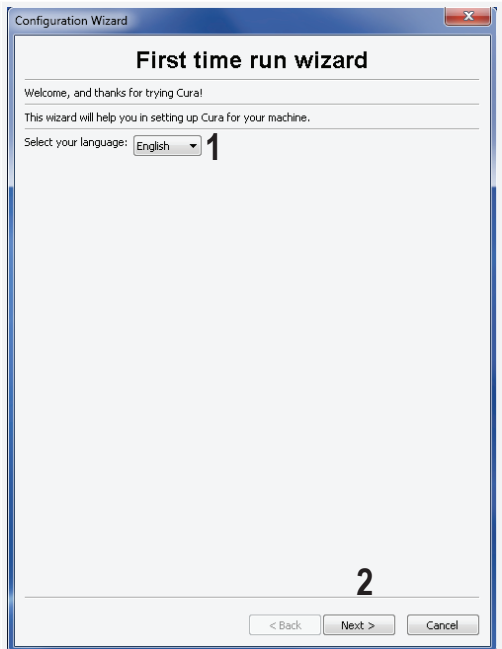
3 Select "Other".

4 Click "Next >".

5 Select "Custom..."

6 Click "Next >".

Custom RepRap information

RepRap machines can be vastly different, so here you can set your own settings.
Be sure to review the default profile before running it on your machine.
If you like a default profile for your machine added,
then make an issue on github.

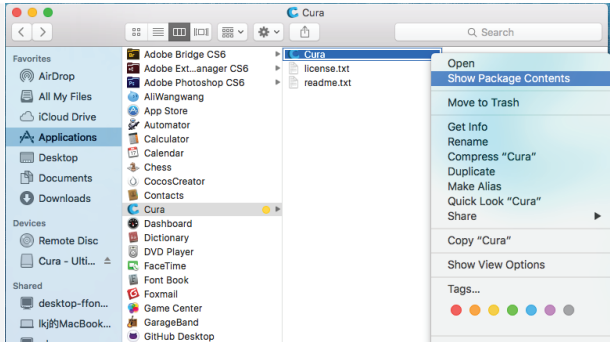You will have to manually install Marlin or Sprinter firmware.

Machine name	RF100 v2
Machine width X (mm)	120
Machine depth Y (mm)	120
Machine height Z (mm)	120
Nozzle size (mm)	0.4
Heated bed	☐
Bed center is 0,0,0 (RoStock)	☐

7

8

< Back | Finish | Cancel

7 Input parameters as shown.

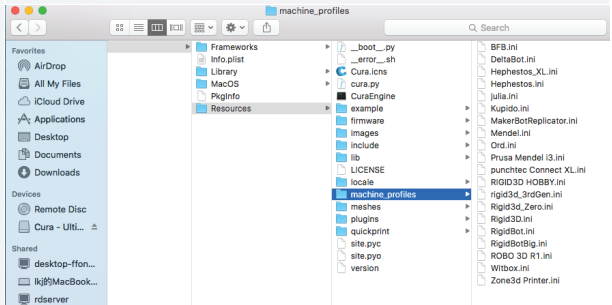8 Click "Finish" to complete the wizard.

d) Setup of the Software - Mac OS

• It is important that you make the printer's profile available to the software before you connect printer and computer.
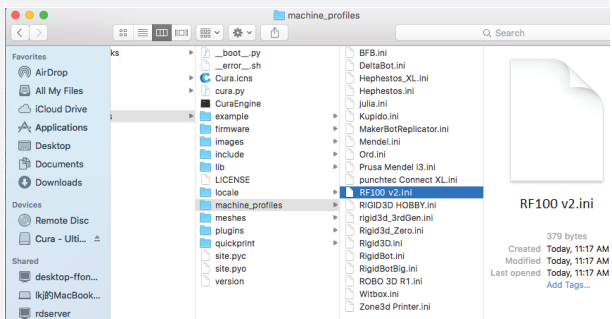
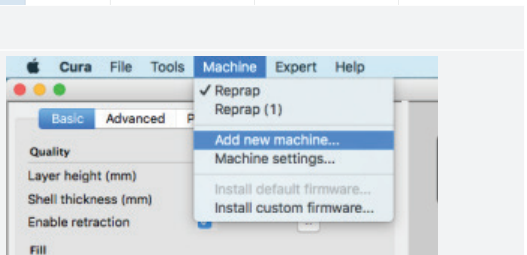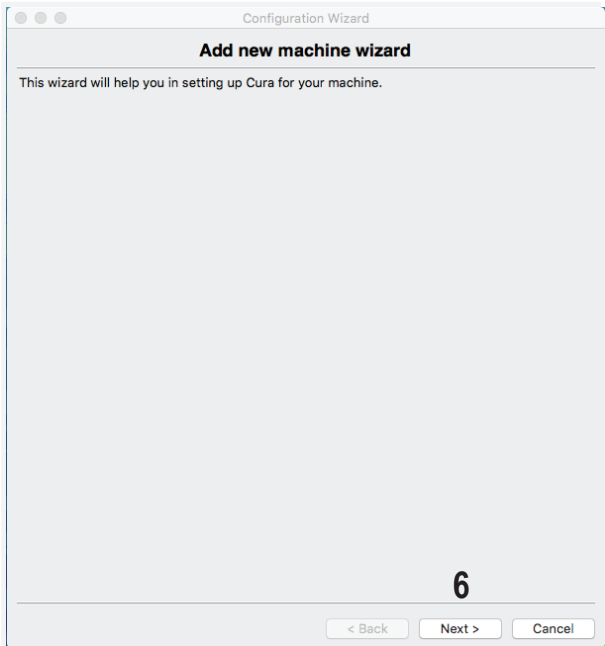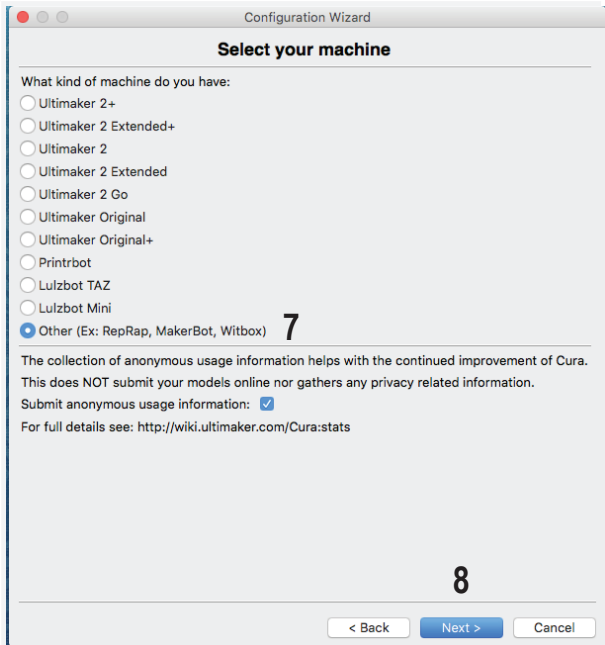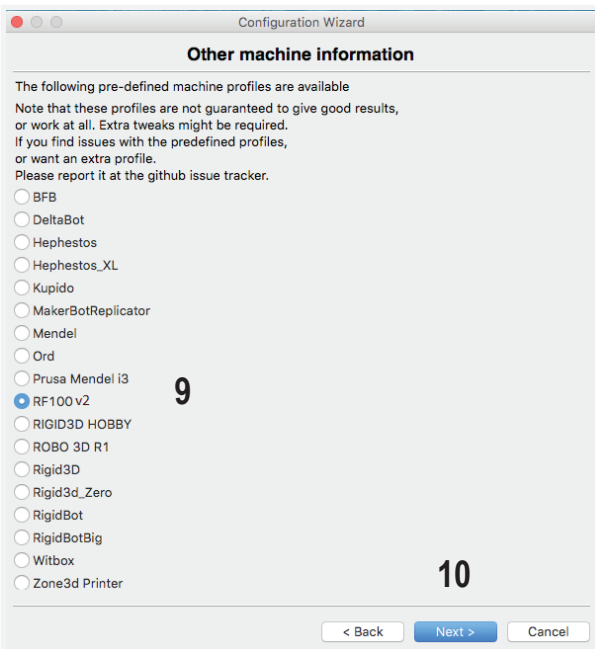|		
1	After installation, locate the "Cura" icon in the "Applications" folder of your computer and right click it. Select "Show Package Contents".	
2	Locate "Resources/machine_profiles".	
3	Locate the " RF100 v2.ini" profile file on the SD card and copy it to "machine_profiles" folder.	
4	Start the "Cura" application.	
5	In "Machine" menu, select "Add new machine...".	

6   Click "Next >".

7   Select "Other".
8   Click "Next >".

9   Select "RF100 v2".

10 Click "Next >".

○ ○ ○   Configuration Wizard

Other machine information

The following pre-defined machine profiles are available
Note that these profiles are not guaranteed to give good results,
or work at all. Extra tweaks might be required.
If you find issues with the predefined profiles,
or want an extra profile.
Please report it at the github issue tracker.

○ BFB
○ DeltaBot
○ Hephestos
○ Hephestos_XL
○ Kupido
○ MakerBotReplicator
○ Mendel
○ Ord
○ Prusa Mendel i3
● RF100 v2   **9**
○ RIGID3D HOBBY
○ ROBO 3D R1
○ Rigid3D
○ Rigid3d_Zero
○ RigidBot
○ RigidBotBig
○ Witbox   **10**
○ Zone3d Printer

< Back   Next >   Cancel

11 Click "Finish". Installation is done.

○ ○ ○   Configuration Wizard

Cura Ready!

Cura is now ready to be used!

                                    11

< Back   Finish   Cancel

e) Software settings - Windows®

⚠️ Further settings can be made optionally here; however, this should only be done by advanced users. For functions, see the online help documentation of the software.

The use of wrong settings can result in damage to the 3D printer or defective printouts. Beginners should first work with the basic settings.

1 Start the software.

2 Select "Machine"

3 Select "Machine settings"

4 Select the serial port to which the 3D printer is connected. The port number is system-independent (for details refer to the chapter "Connect to the 3D printer" on page 28). Set "Baudrate" to 115200.

5 Click "Ok". "Machine settings" will be closed.

6 Set up the parameters in "Basic" Settings" as shown. These are possible parameters for a PLA filament.

→ A tooltip appears when you hover over the parameter with the mouse.

35

7 Set up the parameters in "Advanced" as shown. These are possible parameters for a PLA filament.
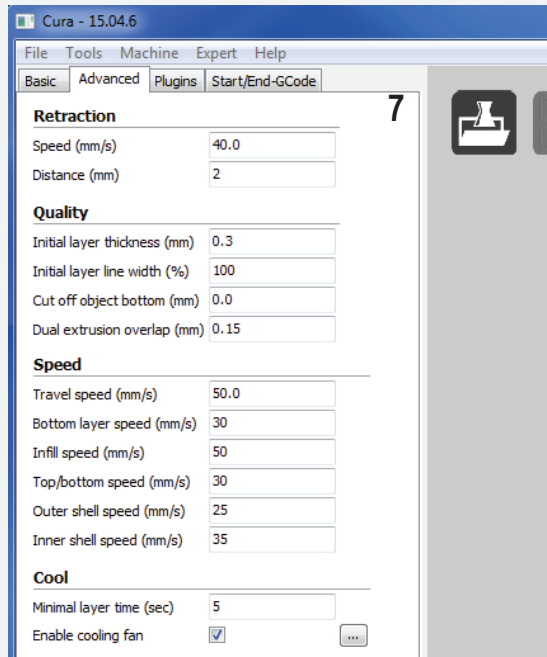
8 Under "Expert", select "Open expert settings".
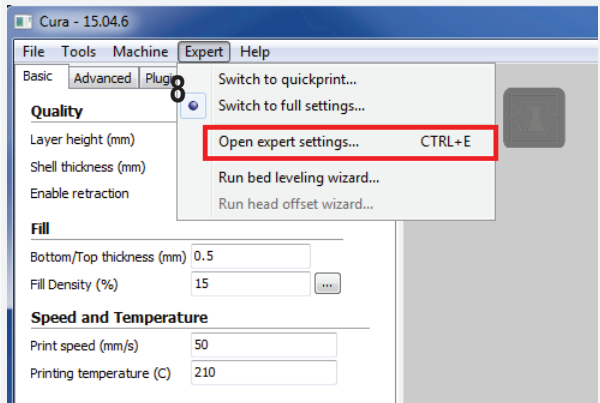
9 Set up the parameters in "Support" settings as shown.

10 Click "Ok".

Filament diameter:

The filament diameter is provided by the filament manufacturer. If you are unable to locate the diameter of the filament you intend to use (e.g. there is no label on the filament spool), you have the possibility of calculating the diameter yourself. Follow the below steps:

1. Measure 1 m of filament for sampling.

2. With the help of a calliper, take at least 10 diameter measurements evenly spread over 1 m.

3. Calculate the average of all measurements, which will give you the diameter of the filament

Since ideal temperatures vary among filament manufacturers, you are encouraged to run your own tests based on the pre-settings to determine the best temperature – filament combination. When performing tests, use 5 °C increments and compare the results during or after printing with other settings. The first layer should always be printed at a slightly higher temperature and more slowly for better adhesion on the build bed.

f) Load configuration file – Windows®

- In order to ease the process of setting parameters for different materials (Wood/Elastic/Copper/PLA), you can load pre-configured material configuration files from the SD card. Such configuration files are also available from www.conrad.com.

1 Click "File"

2 Select "Open Profile...".
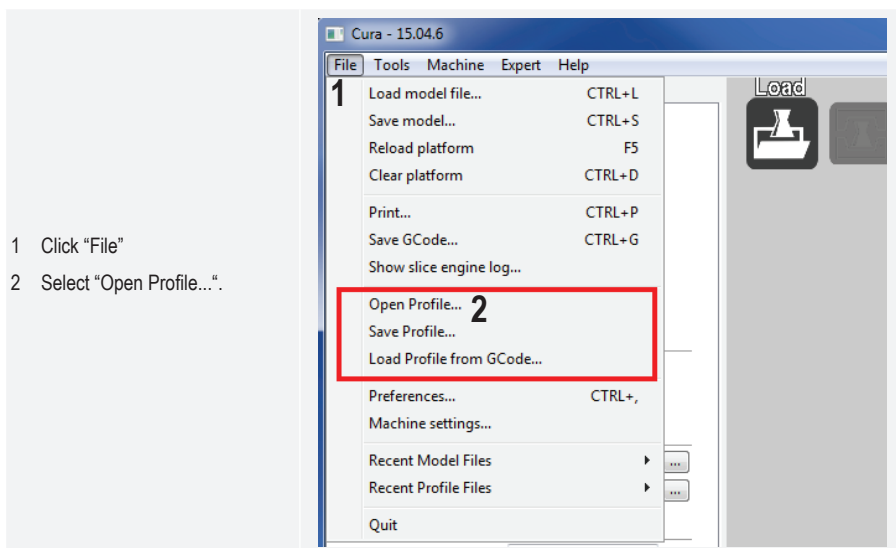
3 Select a filament configuration file for the filament used by you in the selection window and confirm your selection.

→ There are several configuration files on the enclosed SD card in the main folder "Config". Alternatively, skip this step and follow the settings in last section (for details refer to chapter "e) Software settings - Windows®" on page 35) for starting the first print.

g) Load configuration file – Mac OS

- Configuration files for Mac OS are not included in the enclosed SD card.
- Download configuration files at www.conrad.com/downloads.
- Copy them to your computer.
- Load the configuration files by repeating steps as described in the chapter "d) Setup of the Software - Mac OS" on page 32.

→ Ensure to download configuration files starting with "RF100 v2-XXX". As those files are suitable for Mac OS. Files starting with "Config-xxx" are suitable for Windows®.

h) Load model file – Windows® and Mac OS

- In the main folder "3D Models" on the enclosed SD card, you will find a few examples for the first printing attempts. However, there are already many places online where you can download 3D model files. Alternatively, you can also use a 3D programme to make your own. Ensure that the 3D model file is in .stl format (STL-file).

- Load the model file by dragging it onto the virtual build bed in the main window or by clicking the button. The file will be converted automatically to .gcode format.
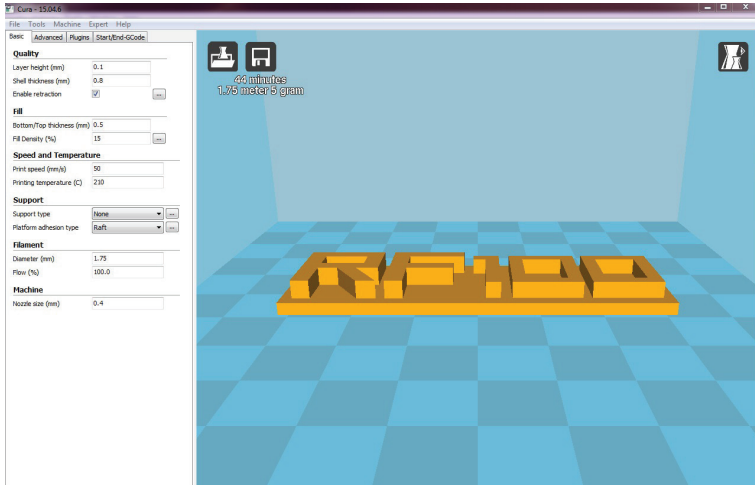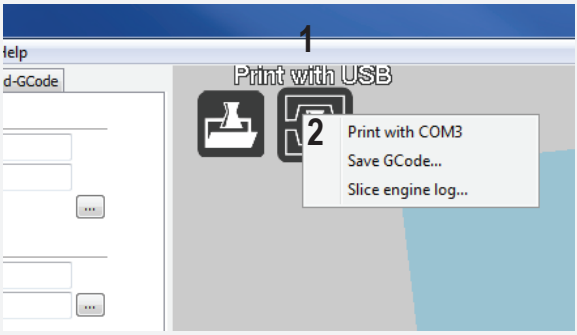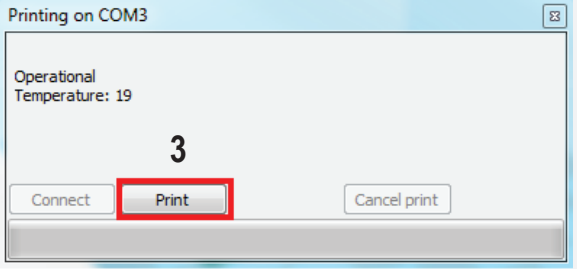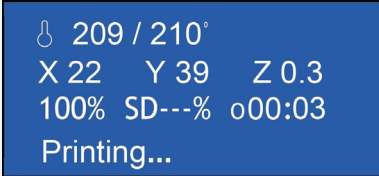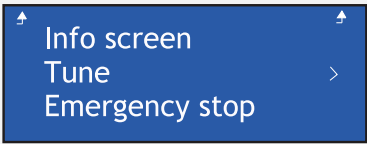
When the SD card is not inserted in the computer, click the button to save the GCODE file on the computer.

- For off-line printing, save the GCODE file onto the SD card. Then insert the SD card into the printer and directly start printing from the printer's control panel.

- When the SD card is connected to the computer, the button turns into enabling you to save the file onto the SD card.

i) Start printing

• Once the printer is connected to the computer via the USB cable, print icon appears.

1	Right click the icon . Select "Print from COM3" to start printing. (Alternatively you can save the g.code to SD card)	
2	Click "Print". The nozzle heats up. Once the "Printing temperature" is reached, the 3D printer is ready to start printing.	
3	3D printer starts printing. < Info screen > appears on the LC display of the control panel.	209 / 210° X 22 Y 39 Z 0.3 100% SD---% o00:03 Printing...
4	Press the control knob to enter the < Main > Menu. If needed, adjust the parameters during printing (for details refer to "c) Adjust parameters during printing" on page 26) or in any emergency case select < Emergency stop >.	Info screen Tune Emergency stop

j) Stop printing

Select "Cancel print" in "Cura" software to abort the printing process.

⟶ Since there is a buffer setting of data streaming in the software, it can take up to 1 minute for the printer to stop after the button is pressed.

While nozzle is heating, do not select "Cancel print"; otherwise, you have to unplug the USB cable and restart the printer.

Nozzle temperature will be maintained after cancelling the print job. Let the nozzle cool down by setting the temperature to 0 °C and move the build bed down through the < Move axis > menu in the printer. Then, unplug the USB cable and restart the printer.

k) Perform < Emergency Stop >

• Select < Emergencey Stop > at the control knob to terminate any running tasks immediately.

• Restart the 3D printer (for details refer to "f) Restart the 3D printer" on page 27).

17. Cleaning and maintenance

⚠ Never use aggressive detergents, rubbing alcohol or other chemical solutions, as these could damage the casing or even impair the functioning of the product.

Never submerge the product in water.

🔥 Danger of burns! Do not touch the hot nozzle directly with bare hands.

a) Clean the device

• Use a dry, soft cloth or brush to clean the outside of the 3D printer.

b) Clean the nozzle

Cleaning of the outside of the nozzle

• Use a dry, soft cloth or similar to carefully wipe off the nozzle after each print.

⟶ The nozzle still has to be hot for this. If this is not the case, heat up the extruder nozzle first.

Cleaning of the inside of the nozzle

• Heat up the nozzle then load and unload filament repeatedly until the filament flow is as expected.

→ If the nozzle continues not to extrude enough material after this procedure, let the nozzle cool down to the lower melt temperature of the filament as indicated by the manufacturer (filament material must only be viscous anymore) and carefully unload the filament until the filament has been transported out of the extruder, including contamination. Cut off the contaminated part of the filament and reinsert it after heating up the nozzle again.

c) Clean the inside of the extruder

• For details, download the separate hints booklet "Cleaning and maintenance" at www.conrad.com/downloads or scan the QR code shown on page 5. Follow the instructions on the website.

d) Clean the build bed

• Use the scraper to carefully remove residue from the build bed.

e) Replace fuse

Disconnect the 3D printer from the mains and computer before replacing the fuse (unplug the mains plug) and let the printer cool down.

Never repair fuses or bridge the fuse holder.

• Switch the power switch into the off position O and disconnect the printer from the mains supply.

• One spare fuse is stored in the fuse compartment between the power supply socket and power switch.

• For further fuses, ensure that you only use fuses of the specified type and rated current (see "Technical Data") as replacement.
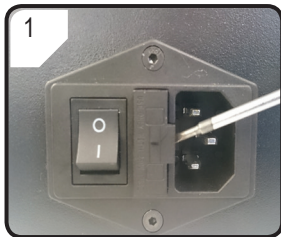
• Use a suitable screwdriver to open the fuse holder out of the fuse compartment carefully.
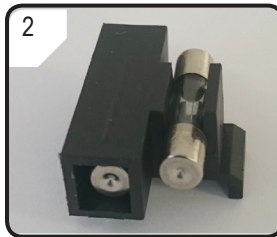
• Remove the defective fuse and replace it with a new fuse.

• Carefully push the fuse holder with the new fuse back into the fuse compartment.
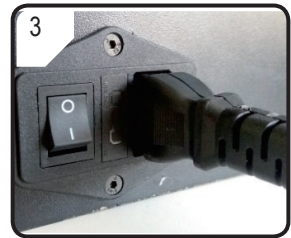
• Reconnect the device to the mains voltage and take it into operation.

f) Unload filament

• Ensure the nozzle temperature reaches 170 °C or above.

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┌─────────────────────┐   ┌─────────────────────┐
│ 1                   │   │ 2                   │
│                     │   │                     │
│ ▲ Main              │   │ › Unload filament   │
│   Auto home         │   │   Move axis      ›  │
│   Level Bed      ›  │   │   Disable steppers  │
│ › Preheat PLA       │   │   Temperature    ›  │
│                     │   │                     │
└─────────────────────┘   └─────────────────────┘
```
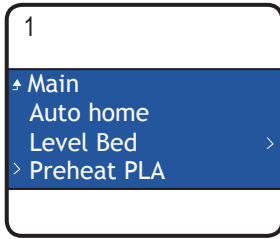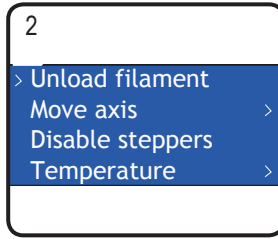
• Select < Preheat PLA >.   • Select < Unload filament >.

                                • Remove filament spool from the
                                  filament spool holder.

⟶   If the filament material is either wood or metal, cut it and replace it with PLA filament first as described in
     section"d) Change / Replace filament" on page 24, then unload the PLA filament. The PLA filament
     removes possible residue left behind by the wood or metal filament.

g) Store the 3D printer

• Unload the filament.

• Move the power switch into the off position O and disconnect the printer from the mains voltage. Let the printer cool
  down to room temperature.

• Clean the printer if you are not going to use it for an extended period of time.

• Store it in a dry, dust-free location out of the reach of children.

18. Troubleshooting

Problem	Possible Solution
The 3D printer does not work after switching on. The display and print space lighting remain dark.	Check the connection of the mains line.
	Check the mains socket. Is it properly supplied with current?
	Check the mains fuse (for details refer to chapter „e) Replace fuse" on page 4242.)
No USB connection to the 3D printer is possible.	Check the USB line connection.
	Is the assigned USB port selected in the software?
	Check whether required drivers are installed.
	Unplug the USB cable and then plug it in again.
	Switch the 3D printer off and on again.
	Restart the computer.
	Use another USB port on your computer.
	Connect the 3D printer directly to a USB port on your computer. Do not use any USB hub.
The printing object has defects.	Check the nozzle temperature settings. It must match the filament material and print object. Experiment with the temperature settings.
	Only start printing when the nozzle has reached temperature.
	Reduce the distance between the build bed and nozzle (refer to chapter "a) Calibrate build bed" on page 21).
	When printing from the PC, do not use any other programs requiring high computing power. Virus scanners and downloads may also impair signal transfer to the 3D printer. Try performing the same print from the SD card to ensure that the USB connection is not the cause of the problems.
	Remove any excessive filament on nozzle before each print.
The filament supply breaks off or there is not enough filament material supplied.	Check the filament spool. It must turn easily.
	Check whether the filament is trapped somewhere on its way from spool to extruder.
	Check whether the filament is properly inserted through the filament tube.
	Check whether the temperature of the nozzle is too low for filament material used.
	Check whether the nozzle is clogged. Clean the nozzle (for details refer to chapter "b) Clean the nozzle" on page 41).

Problem	Possible Solution
Printings stops during the process.	Disconnect computer from 3D printer while printing from SD card.
	Check the settings of your computer. It must not switch to standby mode while printing (energy option settings) or simply shut down (installation of software or software updates during printing).
The printed object does not adhere to the build bed.	Nozzle temperature is too low. Increase nozzle temperature.
	There are residues on the build bed that prevent adhesion of the object. Clean the build bed (for details refer to chapter „d) Clean the build bed" on page 4242).
	Print speed may be too high. Reduce speed.
	Calibrate the build bed again.
	Add the raft to the print object.
The printed object cannot be removed from the build bed.	Wait until the printed object has cooled down.
	Use the scraper to remove the object.
LC display shows undecipherable content or remains blank.	Restart the 3D printer (refer to chapter "f) Restart the 3D printer" on page 27).
Nozzle cools down unexpectedly.	Select < Preheat PLA> to reheat the nozzle and have further action within following 5 minutes for example load/ unload filament, printing etc.
Moving path of nozzle is blocked.	Always remove any excessive filament on nozzle before each print**.**
Nozzle is clogged.	Clean the inside of the nozzle, for details refer to "b) Clean the nozzle" on page 41.
	Disassemble the extruder for further cleaning, for details refer to "c) Clean the inside of the extruder" on page 42.
	Replace the extruder unit (available under item no. 1522157).
Extruder takes wrong direction during printing.	Check whether the filament spool moves smoothly on its holder.
Filament becomes stuck during unloading.	Load and unload filament.
The extruder does not heat up or does not stop heating.	Restart the 3D printer (refer to chapter „f) Restart the 3D printer" on page 27).
	Select < Preheat PLA > and wait for 2 minutes.
	Check the extruder temperature on the < Info screen >.
	Thermistor and heater are malfunctioning. Replace the thermistor with heater (available under item no. 1538778).
Heating temperature is similar to room temperature or continuously 0 °C	Thermistor and heater are malfunctioning. Replace the thermistor with heater (available under item no. 1538778).

Problem	Possible Solution
"Temp sensor error" is shown on the display, control knob is without any function and 3 D printer does not work.	Switch off the 3 D printer. Remove protective case of the extruder unit and check whether all cables are connected correctly.
	Thermistor and heater are malfunctioning and cannot detect the extruder temperature correctly Replace the thermistor with heater (available under item no. 1538778).

19. Disposal

Electronic devices are recyclable waste and must not be disposed of in the household waste. At the end of its service life, dispose of the product according to the relevant statutory regulations.

You thus fulfil your statutory obligations and contribute to the protection of the environment.

20. Technical data

Operating voltage .... 100 - 240 V/AC, 50/60 Hz

Power consumption .... max. 60 W

Power consumption during standby ..... 1.08 W

Fuse.. F5AL, 250V

Production process .... Fused filament fabrication (FFF)

Model size (W x H x D) .... max. 120 x 120 x 120 mm

Printing layer resolution .... 0.1 - 0.2 mm

Print speed .... 30 - 300 mm / s

Print format .... GCODE

Nozzle (ø) .... 0.4 mm

Filament (ø) .... 1.75 mm

Suitable filament material .... PLA, Flexible, Wood, Pearl, Elastic, Copper, Aluminium

Extruding temperature. .... +180 to +260 °C
(when nozzle temperature ranges between 230 to 260°C, operation time must not exceed 10 mins per cycle)

Interfaces .... USB 2.0 and SD card reader

System requirements .... Windows® XP or later, Mac OS 10.6.8 or later

Compatible with "Cura" software .... Version 15.04.6 or lower

Operating conditions .... +5 to +55 °C, 30 – 90 % relative humidity (non-condensing)

Storage conditions .... +5 to +35 °C, 30 – 90 % relative humidity (non-condensing)

Dimensions (W x H x D) .... 295 x 331 x 351 mm

Weight .... 9.5 kg