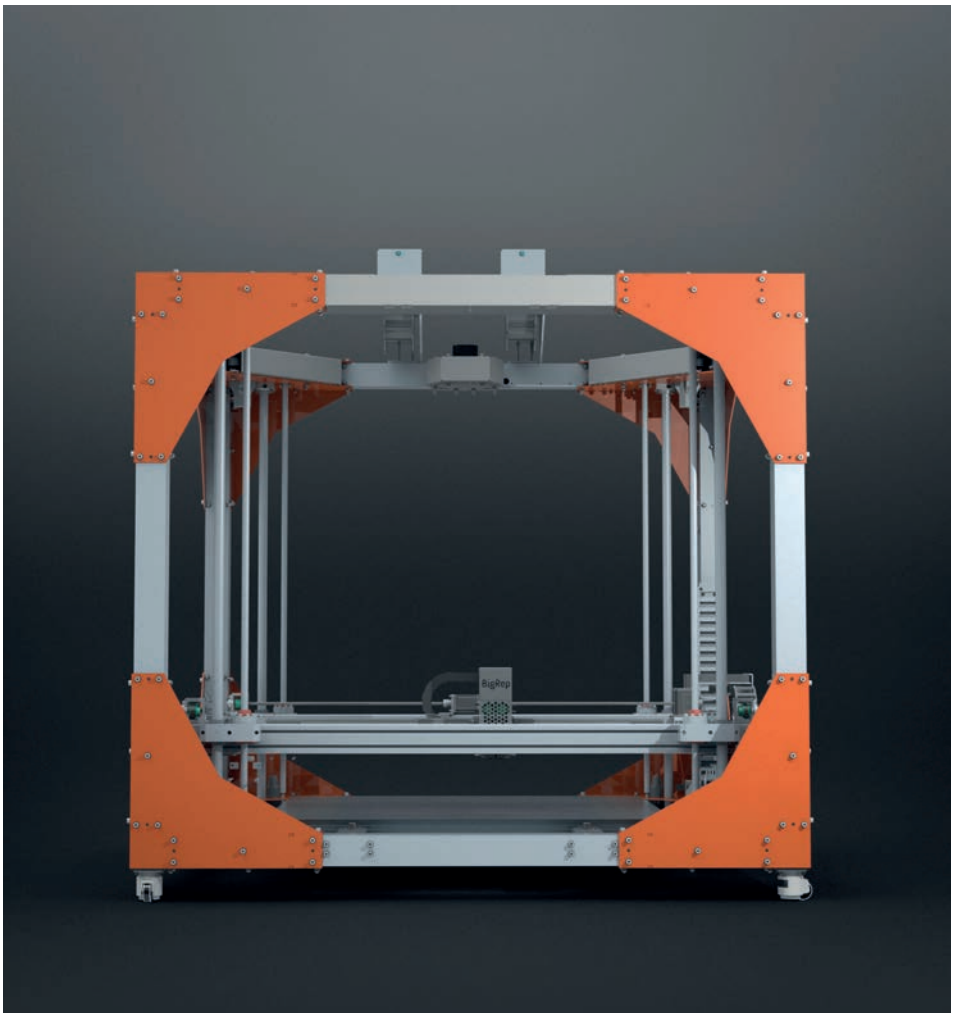
BigRep ONE.2

Full Scale 3D Printer



OPERATING INSTRUCTIONS

Translation of the original operating instructions.

1.02.02
2015/04/09

Table of contents

1. Introduction

Please carefully read this manual before use. Save this manual in an accessible location for future reference.

If you have any further questions please contact Customer Care at support@bigrep.com

1.1. Information

Copyright/Masthead

BigRep GmbH
Gneisenaustraße 66
10961 Berlin
Germany

Managing Directors: Lukas Oehmigen, René Gurka

Contact: support@bigrep.com

Guarantee and Warranty

The manufacturer provides a warranty of 12 months from the date of delivery.

Liability Limitation

The manufacturer assumes no liability for damages arising by

- Non-observance of this manual
- Use of the machine which is not according to specifications
- Use of unauthorized spare parts
- Own conversion of the machine

Status of manual / Version

2015/04/01

EN-US / Translation of the original operating instructions.

1.2. Technical specifications

Manufacturer	BigRep GmbH Berlin / Germany	Model Version	BigRep ONE.2 1.02.02
Dimensions [mm]	1800 x 1850 x 2000		
Weight control unit	appx. 70 kg	Weight printer	appx. 410 kg
Layer thickness resolution (Z)	≥ 300 µm [3]	Tool heads	Dual Nozzle
Fabrication methods	FFF 3D Printing	Print surface	Heated build surface
Build volume [mm] (X:Y:Z)	980 x 1050 x 1100 (in CE version Z:950)		
Positioning accuracy (X:Y)	50 µm	Temperature table	Max. 100°C [2] Max. 212°F [2]
Positioning accuracy (X:Y)(Z)	< 20 µm	Temperature extruder head	Max. 260°C [2] Max. 500°F [2]
Application range (ambient temp.)	+10°C – +40°C +50°F – +104°F	Power supply	230V, 16A, 50Hz 110V, 32A, 60Hz[1]
Supported printing materials (*experimentel)	PLA, CoPolymer, Laywood, Laybrick, ABS*, PC*, PA*, TPE*	Support material	PVA, PS
Supported filament diameters	2,75 mm - 3 mm	Supported nozzle sizes	0,5 mm / 1 mm

[1] Only specified versions. See identification plate.

[2] Higher temperatures lead to damage.

[3] Depends on extruder head type and nozzle size.

1.3. Shipping

Completely assembled in Wooden Box (1,95 m X 1,95 m X 1,95 m).

1.4. Disposal

Disposal by a specialist disposal company is recommended. The disposal regulations at the time of disposal of the country in which the equipment is operated do apply. The operator is obliged to comply with these guidelines when disposing.

2. Safety

2.1. Explanation of safety symbols

DANGER

This warning indicates an imminent danger. Non-compliance leads to serious injury or death.

WARNING

This warning indicates a potential hazard. Non-compliance can lead to serious injury or death.

CAUTION

This warning indicates a potentially hazardous situation that may result in minor or moderate injury.

Pay particular attention to this important information.
(damages could result if relevant precautions are not taken)

2.2. Safety

Compliant Use

The BigRep ONE.2 is used to create 3D-printed objects from suitable filament. The instruction for the machine is created in a computer and then transferred to the machine via an USB-port.

A 3D-printed object is created layer by layer from melted filament (extrudate) from the transmitted data. (Additive manufacturing process – FFF –Fused Filament Fabrication).

The use of non-approved filament may lead to negative printing results, contamination, damage and failure.

The printer should be used only for additive printing processes (FFF).

A list of tested and approved filaments can be found on our website at www.bigrep.com

Hazards

Hazard from electrical current

HAZARD – HIGH VOLTAGE

In case of contact with live parts, an immediate danger of death by electrocution is possible. If the insulation of live parts is damaged, immediately unplug the machine from electrical power and carry out repairs by qualified personnel.

Never bridge fuses or take them out of service. Keep moisture away from live parts.

Unplug the machine if there is water damage.

Completely unplug the system and separate from electrical power before all work on electrical devices, as well as maintenance and repair work. Work must be performed only by qualified personnel.

Hazard from chemicals

No hazardous fumes arise when authorized filament is properly used.

Never clean the table surface with solvent-containing cleaner. This can produce toxic fumes when heated.

The use of non-approved filament may release fumes hazardous to health.

Hazard from turning parts

There is a risk of being caught in turning machine parts. Wear close fitting clothing. Protect long hair with appropriate covering.

Hazard due to barriers in the head region

CAUTION

Warning against shock injuries. Wear a helmet when working in the machine.

Operator obligation

The operator is that person who operates the machine for commercial or business purposes himself, or allows third parties to do so, and who, during operation, carries legal product responsibility to protect the user, staff or third parties.

Operator‘s obligations:

- Know and comply to valid work protection conditions
- Provide necessary protective equipment
- Make operator‘s manual available and ensure that all operators of the unit read the manual
- Regularly check protective equipment on the machine (for example, the emergency stop button)
- Check the printer regularly for defects
- Ensure before every printing job that the machine is free of objects and cannot be accessed by unauthorized persons

Protection

A helmet should be worn during operation on the machine.

Protective equipment

The BigRep ONE.2 is equipped with an emergency stop switch **(f)**:
All moving parts are stopped by pressing on the emergency stop switch; the table heat is switched off, and the printing process is interrupted!

The emergency stop switch does not shut off the power.
For this purpose, always turn the main switch **(e)** to **Off**.

Fig. 2-1:
Emergency stop switch

In order to allow the unit to restart after an emergency stop, turn the emergency stop switch to the right to unlock. Then press reset **(g)** to activate the machine again. The printing process has to be restarted from the beginning.

Environmental protection

Observe the manufacturer‘s instructions for disposal of filament.

3. Assembly and function

3.1. Short description

The BigRep ONE.2 is a full-scale FFF 3D-Printer for studio and professional with an 980 mm x 1050 mm x 1100 mm (ca. 1.3m^3) working volume. A printing volume of over 1m^3 makes it possible to produce prototypes and models 1:1, or to create final products, such as designer furniture, directly with the 3D printing method.

BigRep ONE.2 is constructed with an uncompromising full aluminum frame, incorporating professional CNC components to provide strength and robustness for thousands of successful printing hours.

3.2. Included in the delivery (depending upon model)

- BigRep ONE.2 (including extruder head)
- 2 hot ends (pre-assembled), 1 mm and 0.5 mm nozzle diameters
- 2 separate hot ends (1 mm + 0,5 mm nozzle diameter)
- Control panel unit
- Hex key to change the extruder head (M2, M3, M10)
- Scraper
- Feeler gauge for calibrating nozzle height

3.3. Overview BigRep ONE.2

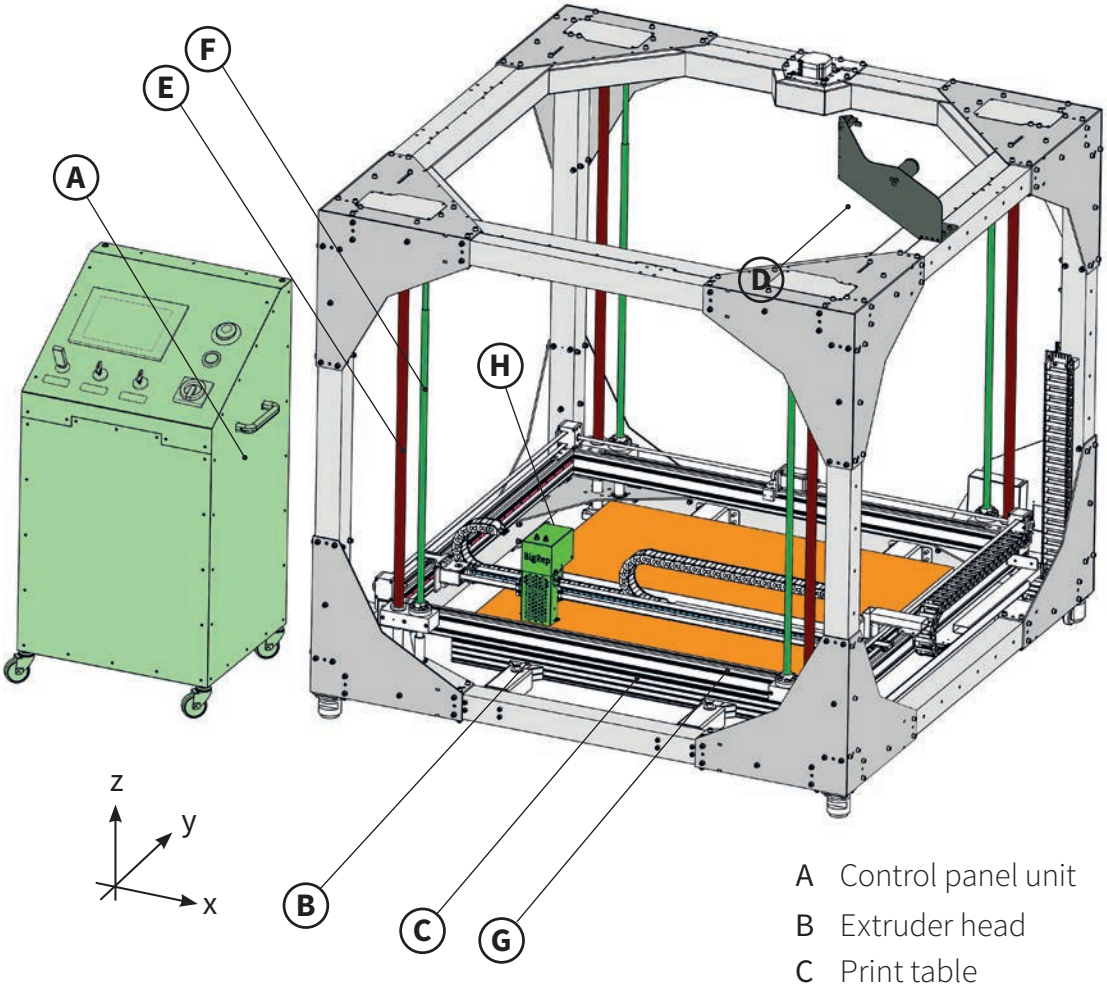


Fig. 3-1: BigRep ONE.2 with control panel

- A Control panel unit
- B Extruder head
- C Print table
- D Filament roll holder
- E Z-guide shafts
- F Z-lead spindles
- G X-guide rails
- H Y-guide rails

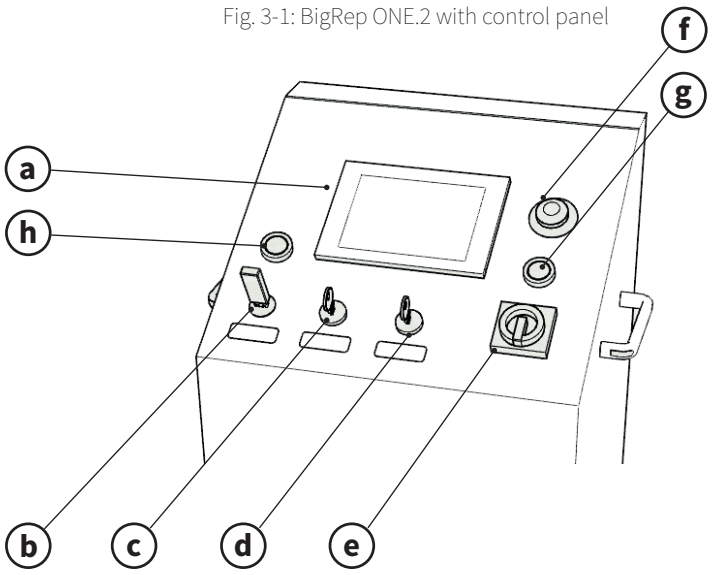


Fig. 3-2: Control panel

- a Display
- b USB port
- c Display switch
- d Table heater switch
- e Main switch
- f Emergency stop switch
- g Reset button
- h Z-unblock

3.4. The BigRep ONE.2 in detail

Description of modules (↗ Fig. 3.1)

(A) Control panel unit
Control of the printer, display of information

(B) Extruder head with hot ends
Melting of the filament, printing

(C) Print table
Heated, covered with glued table protection layer (orange film)

(D) Filament roll holder (2 rolls)

(E) Z-guide shafts (4 pieces)

(F) Z-lead spindles (4 pieces)

(G) X-guide rails (2 pieces, one above the other)

(H) Y-guide rails (2 pieces, opposite sides)

Control panel (A) (Fig. 3.2)

(a) Display with touchscreen
Operation of BigRep ONE.2 (Graphic User Interface)

(b) USB port
For loading the print instructions (G-code) from USB media

(c) Display switch
Key switch, turns the display on/off

(d) Table heater switch
Key switch, turns the table heater on/off

(e) Main switch
Turns power on/off, starts BigRep ONE.2

(f) Emergency stop switch
Shutdown of all moving parts and the heating table

(g) Reset button
For restart after pressing the emergency stop switch

(h) Z-unblock
Enables homing of Z-axis

3.5. Software

We recommend KISSlicer as slicing software [http://www.kisslicer.com]

Use the delivered KISSlicer configuration file. This file contains all necessary settings. You can request the latest version of the configuration file from customer care.

Note: Set the correct print table size when using slicing software different to KISSlicer. The Z-Offset must be set to zero. Wrong settings can lead to damages.

3.6. Interface

The BigRep ONE.2 is operated via the touchscreen interface (a) on the control panel.

Note the separate manual for the interface.

4. Installation and commissioning

The separately included transport manual must be observed before delivery without a service setup.

4.1. Transport

The equipment must be unplugged from the power supply before every transport operation, and the cable connection from the control panel (A) and the equipment must be pulled out.

The BigRep ONE.2 can be moved by utilising the four transport wheels mounted under the frame. Immediately after transport, the transport wheels must be locked again to prevent accidental rolling of the machinery. Turn the levelling spindles counterclockwise to loosen the transport wheels.

The table must be aligned again after transport. ↗ Chap. 4.4.

4.2. Set-up site / Requirements

Make sure that the floor is level.

Ensure sufficient ceiling clearance (minimum 1 m from unit to ceiling).

Ensure that the floor can bear the weight!

The device may only be operated in a safe environment (special room safety cage or the like), may be entered only be done by trained operators and only be entered when the machine is switched off. The operator shall bear the responsibility.

The machine may not be accessible to unauthorized persons especially after the start of the print program.

Ensure for a good printing process:

- Avoid high humidity
- The temperature in the operating environment may not exceed 40°C / 104°F
- Avoid strong drafts during the printing process
- Avoid direct sunlight on the machine
- Do not install the machine on a floor that could be subject to vibrations
- Avoid dusty operating environments (e.g. cutting dust)

4.3. First use, connecting the printer

If you have chosen to purchase the BigRep ONE.2 without a service setup, you will receive a separate manual for first use.

Connect the unit only to the mains after you have aligned frames and table. ↗ Chap. 4.4. Align frames and table

4.4. Align frames and table

Alignment of the frame

After each transport, the machine must be aligned horizontally using the adjustable feet with the aid of a spirit level.

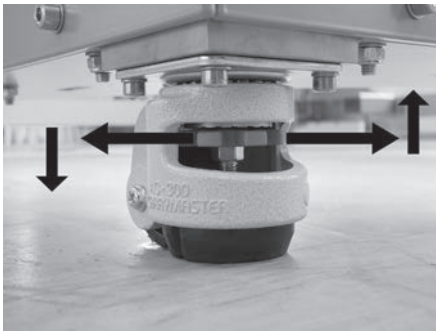


Fig. 4-3: Height adjustment

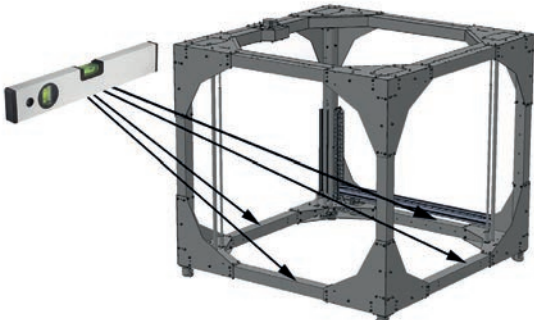


Fig. 4-4: Alignment of the frame with spirit level

In order to set the height and the horizontal alignment of the machine, the height adjustment (levelling spindles) should be turned accordingly to Fig. 4-3, and the horizontal alignment must be checked with a water level (Fig. 4-4).

Also the table must be checked monthly, after each transport and regular use.

Alignment of the print table (leveling)

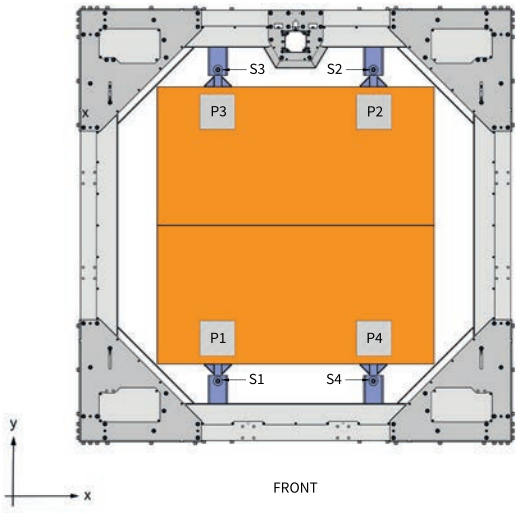


Fig. 4-5: Alignment of the table

› Move the table up/down by turning screws **S1-S4** (Fig. 4-5) Clockwise moves table up, counterclockwise moves the table down.

ⓘ Never completely unscrew the screws, otherwise the table will separate from the suspension.

› Move the extruder head to the home position using the interface. ↗ Interface-Manual | Homing
› Switch off the BigRep ONE.2 using the main switch (e)!
› Move the extruder head (B) manually by hand to **P1** area (Fig. 4-5).

ⓘ Never move the extruder head manually by hand while machine is connected to power source! Induced voltage leads to damage.

› Put the fitting blade of the feeler gauge (delivered with the machine) between the table and the nozzles. (The reference value is 0,35 mm. This is about the thickness of a sheet of paper).
› Turn screw **S1** in a clockwise direction until the nozzle and the gauge blade nearly touch without clamping.
› Remove the gauge blade. (Never leave the blade on the table when manually moving the extruder!)
› Set the extruder head manually by hand to **P2**, and set the distance between the table and nozzle in the same way
› Proceed in the same way for **P3** and **P4**.

› Then run through all four points **P1-P4** again. Double check all 4 points until the correct distance between the table and the nozzle at all four points is the thickness of the gauge blade.

Move the extruder head slowly across the table. The table may not touch any point, as the table protection layer or the nozzle could be damaged.

Turn on the main switch (e) again when the distance is set correctly. The machine is ready for use again.

4.5. Disassembly

The machine must be disconnected from the mains before disassembly.

Please contact Customer Care if you have questions:
support@bigrep.com

5. Service and operations

5.1. Safety

Wear a helmet when working with the machine as well as taking things out of the machine!

CAUTION

Do not reach into the machine during the printing process. There is an injury hazard from moving parts!

CAUTION

The machine has both hot and rotating components. After ending the printing process, components and the printed object may be hot. Danger of burns!

Seek a doctor immediately in case of burns!

The machine may only be operated when completely assembled. Otherwise, the safety of man and machine is not guaranteed and the operating license expires.

5.2. Using the BigRep ONE.2

Note in the following steps the separate Interface Manual as well as the on-screen assistance of the interface.

The current corresponding interface manual for your specific firmware can be found on our website [www.bigrep.com].

Print a component

Preparation

› Check and verify that the machine operates normaly

Before any print operation ensure that the machine is free of objects and cannot be accessed by unauthorized persons

› Clean the print surface ↗ Chap. 7. Maintenance and Care
› Turn on the main switch (e)
› Turn on the display (c), switch on the table heating (d)
› Home the extruder head ↗ Interface Manual | Homing
› Check the filament. If necessary, change the filament.
↗ Chap. 6.1. Changing the filament

› Control the hot end. If necessary, clean the nozzle (Fig. 6-1, (iv)). Mount the correct nozzle if there is a new hot end filament diameter
↗ Chap. 6.2. Change the hot end

Preheat device

› Set the extruder temperature in accordance with the filament in use
› Set the temperature of the table in accordance with selected filament
› Press Pre-Heat in the interface

Load the print file (G-code)

› The G-code which has been generated with your slicing software is transfered via USB medium (b)
› Select the G-code from the USB media using file explorer
› Check that the printing speed is set to that given in the G-code

ⓘ The machine must be homed position before each print job!
↗ Interface Manual | Homing

Start printing

› Only start the print after the extruder and the table are heated correctly.
› Check that the printing process has begun properly

Stop / pause printing

› You can see on the display when the print is finished
› The printing is paused or stopped by pressing on Pause or Resume

Remove component

› Move the extruder head manually with the interface so that the printed part is freely accessible
› Let the table cool to under 40°C / 104 °F

ⓘ If the printed part taken before the table is cooled there is a risk of irreversible change in shape!

› Carefully remove the print object from the table by providing the plastic scraper

6. Changover / Retooling

Read the following instructions completely before you begin replacing any components.

6.1. Changing the filament

The filament change can be done before or during printing process. Please note the different procedure.

Store filament rolls in a dry and cool place. Avoid knotting of the roll by securing the loose filament end into the roll.

Filament change before printing

Move the extruder to home position via the interface.
Remove the filament strand next to the filament guide (3).

With the interface function **Retract** remove the remaining filament from the extruder head.

Extrude remaining filament in the nozzle manually via interface. Clean the nozzle if necessary.

CAUTION

Hot nozzle can cause burns. Do not touch hot nozzle.

If the filament is changed before the filament roll currently being used is used up, roll up the remaining filament and remove the roll.

Load the filament roll holder (D) with the new filament roll. Load the filament end into the extruders heads filament guide (Fig A-2 (5)). Adjust the temperature on the interface if using a new filament material.

Filament change during printing process

Press **Pause** in the interface to pause the printing process.

Never use the homing function during an ongoing print process. Never move extruder head manually in Z-direction. Do not quit the printing process. Otherwise the print object will be unusable.

After pausing, the extruder can be moved in X- and Y-direction via the interface in order to change the filament. Take care that the extruder head never touches the print object while moving.

Remove the filament strand next to the filament guide (3).

With the interface function **Retract** remove the filament from the extruder head.

Extrude remaining filament in the nozzle manually via interface. Clean the nozzle if necessary.

CAUTION

Hot nozzle can cause burns. Do not touch hot nozzle.

Load the filament roll holder **(D)** with the new filament roll**.** Load the filament end into the extruders heads filament guide (Fig A-2 **(5)**). Adjust the temperature on the interface if using a new filament material.

Manually extrude a small amount of the new filament to check whether print process works proper.

Press **Resume** in the interface to continue the print process. The extruder head will automatically move to the position were the machine was paused.

Advanced Tipp
You can change the filament during an ongoing print process without pausing the process. Therefore cut the filament strand next to filament guide **(3)**, load the new filament roll and insert the new filament strand to the filament guide directly after the old one.

6.2. Changing the hot end (Fig. A-1a / A-1b / 6-1)

The filament is heated in the hot end **(8)** and guided through the nozzle **(iv)** with pressure. The extruder head of BigRep ONE.2 is equipped with two separate hot ends that can be replaced individually, for example, to use other nozzle diameters. There is a difference between replacing the hot end mechanicals **(i)** and a complete hot end exchange including the electrical parts **(iii)**.

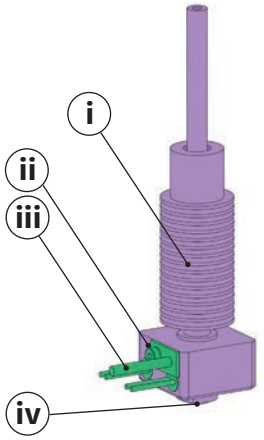


Fig. 6-1: Hot end

The hot end mechanics are exchanged in order to use another nozzle diameter. When changing the hot end mechanics, the electrics (cartridge heaters and sensors) are taken from the removed hot end and mounted in the hot end which will be installed.
↗ Changing the hot end mechanics

Should you need a new hot end, ask Customer Care:
support@bigrep.com

ⓘ The hot end mechanics may only be replaced as a whole. Opening the hot end leads to damage/loss of warranty. In particular, the nozzles found on the hot end may not be replaced individually.

Changing the hot end mechanics

Tool needed

› Allen wrench/hex: 2 mm + 3.0 mm

Procedure

1. Move the extruder head manually with the interface to a position which makes it possible to replace the hot end without problems. Ensure that you have sufficient distance from the table (at least 50 cm).
2. Remove the filament strand out of the filament guide while the nozzle ist hot (Fig A-1 **(3)**) (↗ Interface Manual | Manual Extrusion) Pull out the loose filament end when the motor no longer advances the filament.

ⓘ You can only remove the filament in the hot end when the nozzle is hot. Wait after removal of the filament with the following steps until the nozzle is cooled.

3. Ensure that no impurities have found their way into the filament guide **(3)**. Protect the opening if necessary.
4. Remove the front extrusion head cover by loosening the four screws **(4)** and remove the cover by sliding it forward.
5. Identify the hot end to be replaced (should both be changed, carry out steps 6. to 8. for both parts in the same way).
6. Loosen the hot end electrics **(iii)** with the screw **(ii)** and carefully pull it out of the hot end.

ⓘ Do not attempt to remove the electric parts by pulling the cables. Use a small wire nail to press out the electric parts from the rear side of the hot-end.

7. Hold the hot end to be changed with one hand, lightly loosen its clamping screw **(7)** without completely removing it.

8. Carefully pull out the hot end (8) downward.

Ensure that the hot end does not fall out when the clamping screw (ii) is loosened in order to avoid damage to the hot end and the table surface.

Installation of the new hot end mechanics

Put the new hot end mechanics back into the extruder head. Ensure that the removed hot end mechanics are protected in order to prevent impurities or damage.

1. Move the new hot end mechanics high enough that the shaded areas (9) are flat in one plane
2. Tighten the clamp screw (7)
3. Reinstall the hot end electronics
4. Install the front extrusion head cover

Before you start printing, always move the extruder head to the home position.

Complete hot end exchange

Please contact to Customer Care at support@bigrep.com

7. Maintenance and Care

Cleaning

Clean the surface with industrial alcohol (e.g isopropyl alcohol) and a soft cloth before use. This is to ensure that the print stricks to the bed. Do not use solvent-based cleaners!

ⓘ Do not use abrasive tools/materials for cleaning. Damaged surfaces lead to faulty prints.

During the print process small filament threads can appear which can be caught in the moving fan. Regularly check the fans and clean them if necessary.

Lubrication (Components ↗ Fig. 3-1)

X-guide rail (G), Y-guide rail (H) , Z-lead screw (F) and Z-guide axis (E): clean and lubricate regularly.

Use industrially approved grease for lubrication. Lubricating greases for plain and roller bearings with mineral oil as the base oil are recommended.

ⓘ Do not use grease with solid lubricant such as graphite or MoS_2 (molybdenum disulfide) for lubrication!

Regularly check the lubrication condition of the individual components. Ensure that there always is a light film of lubricant.

Tighten the belts

If you have problems with tension of the belts please turn to Customer Care: support@bigrep.com

Change of the protection film

Please contact Customer Care at support@bigrep.com

Firmware update

Please contact Customer Care at support@bigrep.com

8. Appendix

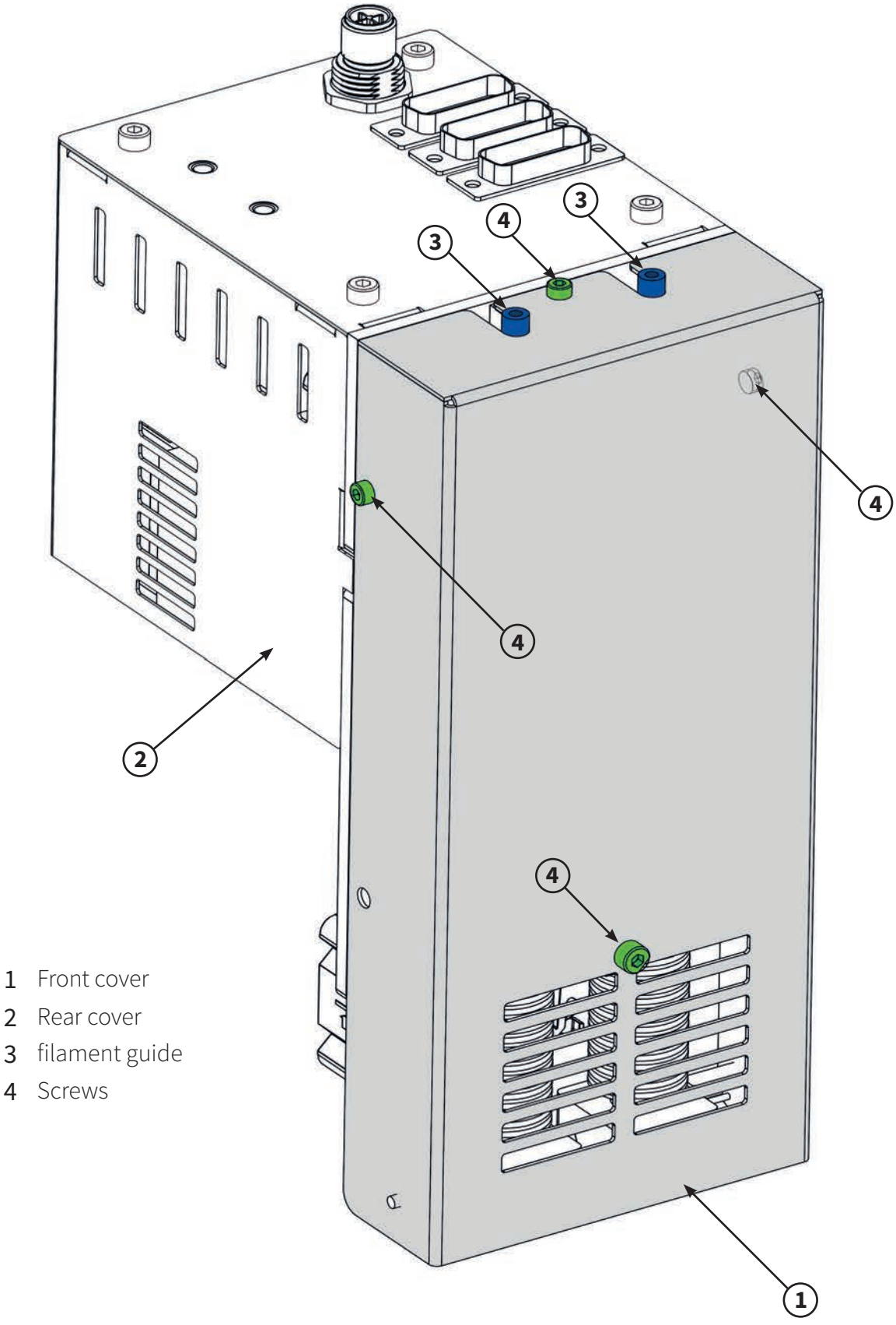
8.1. FAQ / Troubleshooting

You can find the current FAQ list at our home page [www.bigrep.com]

8.2. Glossary

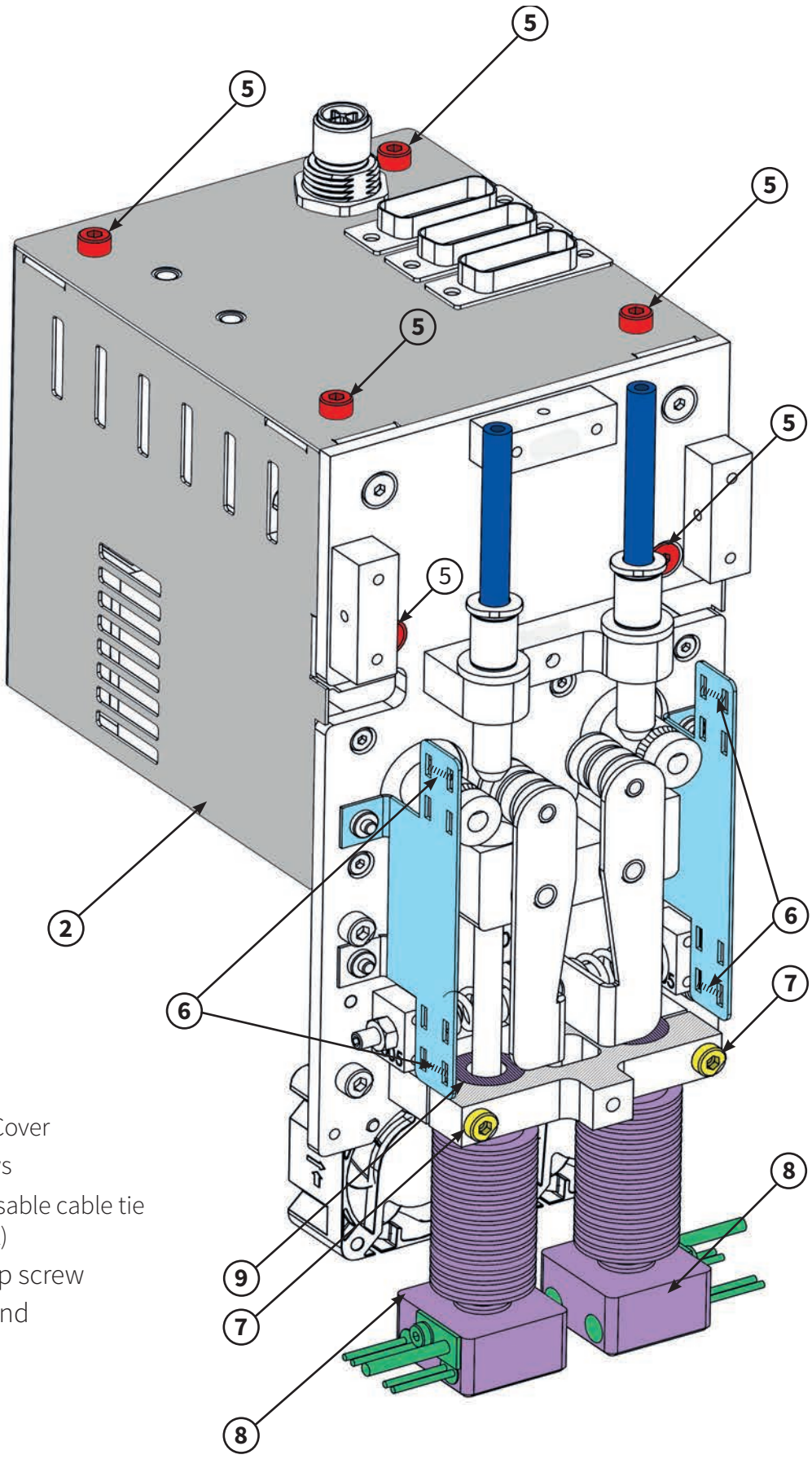
Term	Explanation
Extrusion	Curable materials pressed from a nozzle.
Filament	Fiber string rolled up on a roll. Available in different materials and sizes.
G-code	Provides instructions for the printer (e.g. the moving path of the printer in order to create the desired part). G-code is created with slicing software.
Slicing-Software	Software to translate objects into printer instructions, in form of G-Code.
Home position	Zero position. Starting point for the print.

Notes



1 Front cover
2 Rear cover
3 filament guide
4 Screws

Fig. A-1: Extruder head with front cover



2 Rear Cover
5 Screws
6 Releasable cable tie (black)
7 Clamp screw
8 Hot end

Fig. A-2: Extruder head without front cover

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