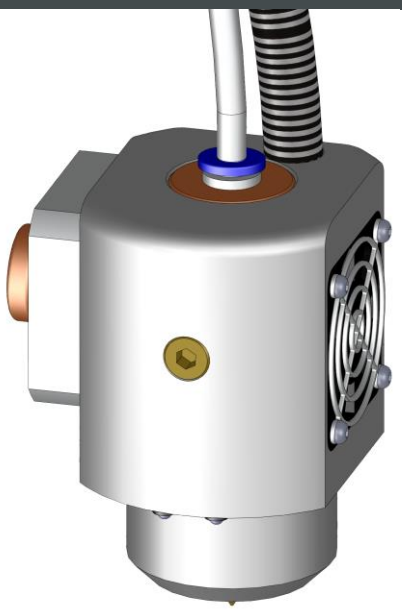
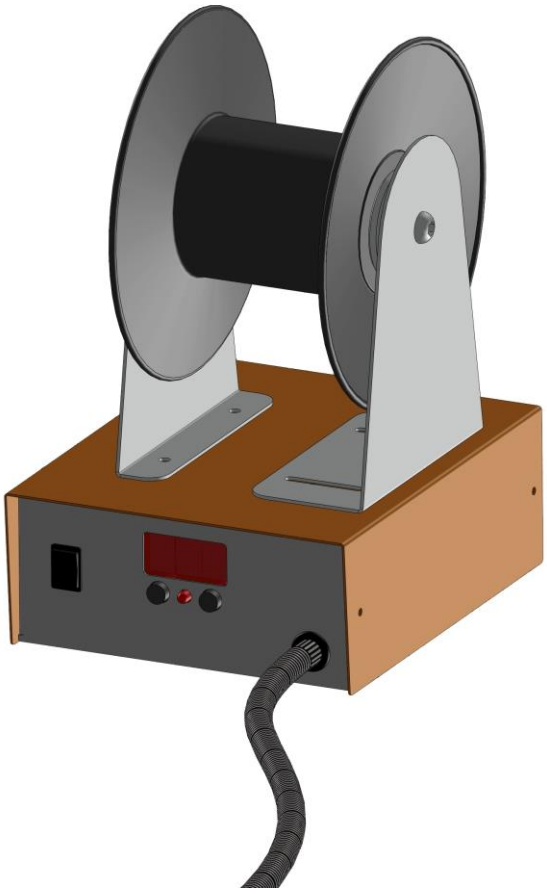
Operating instructions

3D print head FDM 1.75





Original Operating Instructions

Date of: 07-25-2016

Manufacturer:

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Please read these instructions completely before the initial start-up of your machine and only operate the machine when you are sure that you have understood everything.

Always keep this manual close to the device.

Before starting, the proper functioning and technical condition of the device should be checked.

TABLE OF CONTENTS

1 GENERAL INSTRUCTIONS

1.1 INFORMATION AND EXPLANATIONS TO THE OPERATING INSTRUCTIONS

This manual is intended to familiarize you with your STEPCRAFT 3D print head and the associated controller and give you all the necessary information that you need in order to be able to use it safely and professionally.

Please read this manual carefully and completely before starting to use your STEPCRAFT 3D print head.

To minimise the risk of injury and / or to prevent property damage, please only operate the machine and the associated control unit when you are sure that you have understood these instructions completely!

Should questions arise, please contact us. Our contact details can be found on the second page of this manual.

Please keep this manual always in close proximity to the STEPCRAFT 3D print head for future reference.

Use these components only in accordance with their intended use (see point 1.3).

We are not responsible for injury or property damage arising from unintended use or handling, or from use which is not the ordinary use of the 3D print head or from failure to follow the safety regulations (see section 2).

Your warranty claims shall become invalid as a result of lack of maintenance (see point 8) and / or incorrect operation of the individual components.

We reserve the right to make future technical developments on the print head and the controller.

1.2 DESCRIPTION OF THE COMPONENTS:

3D print head consists of a housing having a feed device for the filament, a fan for the active cooling system, the LED status indicator and the hot-end. Here, the introduced filament is heated to the processing temperature, and forced through the filament nozzle. The temperature is accurately monitored by a high-temperature sensor. The print head has at the bottom a 43 mm Euro-neck, which is intended for attachment to the CNC / 3D Desktop System. Various access openings allow for good maintenance of the system.

The control device is hard wired to the print head. It includes selectable temperature control, the filament feed control and the LED and fan control. On the case is the universally adjustable filament holder.

The ready to use unit consists of the following components:

1. Electronic control incl. filament holder
2. 3D print head (permanently connected to the control unit), filament-tube
3. Power supply incl. feeder, input 110V-240V ~ 1.5A 50/60Hz, output 19V 4.74A
4. Connection cable 15 pin Sub-D male-female

For more information about optional accessories, see section 4.4 of this manual.

1.3 Intended Use

The STEPCRAFT 3D print head is for private users (e. g. constructor) and for single or small batch production developed in the commercial sector. It is not suitable for large-scale production or integration into production lines! It is designed for the use of PLA and ABS filaments having a diameter of 1.75 mm. The system is specifically designed for the installation and connection to our STEPCRAFT machine series.

2 Safety

2.1 General Instructions

Please read this manual carefully and completely before starting to use your STEPCRAFT 3D print head. Any person who operates this machine must have read these instructions!

To minimise the risk of injury and / or to prevent property damage, please only operate the machine and the associated control unit when you are sure that you have understood these instructions completely!

Should questions arise, please contact us. Our contact details can be found on the second page of this manual.

Please keep this manual always in close proximity to the STEPCRAFT 3D print head for future reference.

Use this appliance only in accordance with its intended use (see point 1.3). Any improper use may cause personal injury or property damage

No changes and / or modifications to the device are allowed unless this is expressly authorized by us in individual cases.

The STEPCRAFT 3D print head is designed and constructed according to the current state of the art.

2.2 Responsibility of the Operator and Safety at Work

Users of the print head should be over 14 years of age and of good technical knowledge.

As an operator, you are responsible for ensuring that you have read and understood all relevant operating instructions and always keep them in close proximity to the STEPCRAFT 3D print head.

You have to make sure that you operate the print head only in a technically perfect condition.

As an operator, when working with the print head you should at least wear the protective equipment described in the point 2.3.

Always maintain a sufficient distance from the heated parts (hot end) and never reach inside. This can cause severe burns!

Never touch the working piece (to put it to measure, edit or otherwise) while the STEPCRAFT 3D Desktop System is running. Here there is a high risk of injury!

Depending on the area of the machine (private or commercial), please see the applicable occupational safety and health, safety and accident prevention, and environmental regulations.

2.3 Safety Equipment

a.) Protective gloves (to protect hands from burns, abrasions, etc.)

b.) Also, do not wear clothing that can get caught in the machine (ties, scarves, shawls, wide sleeves, etc.) and do not wear jewelry, in particular, no long chains and rings.

2.4 Environmental Requirements

The print head is only suitable for indoor use

Attach the print head in the 43 mm Euro-mounting system of the STEPCRAFT 3D Desktop System. Place the controller so that the cable feed cannot be crushed and the filament supply works without problems

Make sure that around the system is enough room so that you can work comfortably and the machine can fully extend its travels. Ensure enough safety distance from any other machines.

Provide adequate lighting in the machine location and the work place surrounding the machine.

Position the PC that controls the machine, close to the machine, so you will always have both in view.

All the instructions relevant to the machine and its components must be kept within reach.

2.5 Commissioning of the Controller / the Print Head

To operate the jewelry 3D print head and the associated control safely and professionally, before the first commissioning of the entire installation, be sure to read the respective operating instructions for the individual components completely.

Before first use and at regular intervals thereafter, check that the individual components are connected correctly.

Also, check before each use of the system if the electricity supply is working properly.

2.6 Operator

The person operating the print head should be over 14 years of age and of good technical knowledge.

All persons who operate the print head must have read and fully understood all relevant operating instructions.

Each operator must be familiarized before the first use of the print head with the electronic control system and the control software used.

Each operator must have personal protective equipment.

Each operator must use the print head and its components with care and the expertise which is necessary for the use of electrically controlled devices.

2.7 Emergency Stop Switch (on STEPCRAFT 3D Desktop System)

The emergency stop switch is located on the front of the machine (see figure in section 3.1 STEPCRAFT 3D Desktop System manual).

By pressing the switch, the emergency stop is triggered. Hereby the power to the control is interrupted. In addition, the control software receives the signal to stop the operation. The machine will stop with immediate effect.

WARNING! The emergency stop switch can only bring about the cessation of all components when they are connected to it.

This is guaranteed if you use the control board supplied by STEPCRAFT.

If you are using third-party products, such as another control device, you are solely responsible for connecting the emergency stop switch properly to your controller. Otherwise there is a danger of personal injury or damage!

Even if you wish to use a system-held tool, such as a drilling and milling spindle, which has a separate on-off switch and is NOT controlled by the PC, you must ensure that these are connected correctly with the emergency stop switch.

If you do not do this, it will run even when the emergency stop switch is pressed. Again, there is a great danger to persons or property!

If you have any further question, please contact us!

For further information on the emergency stop switch, see point 5.5 of this manual.

2.8 Residual Risk

Despite all precautions, there remains always a risk to persons or property.

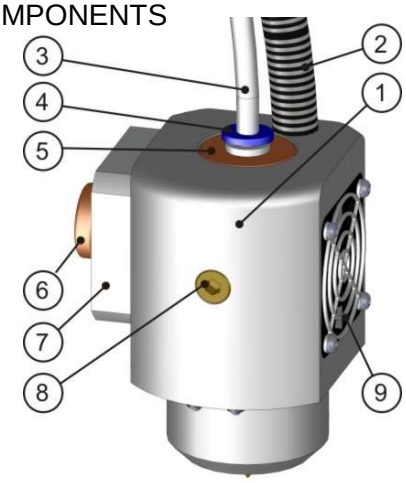
Therefore operate the machine and the STEPCRAFT 3D print head with caution and care!

Make sure you are that you are focused and not tired!

Do not operate the machine and the STEPCRAFT 3D print head under the influence of medication, alcohol or drugs.

3 Design and Function

3.1 Designation of the Print Head Components



1 = Print head main body

2 = Cable lead

3 = Filament supply hose

4 = Hose coupling

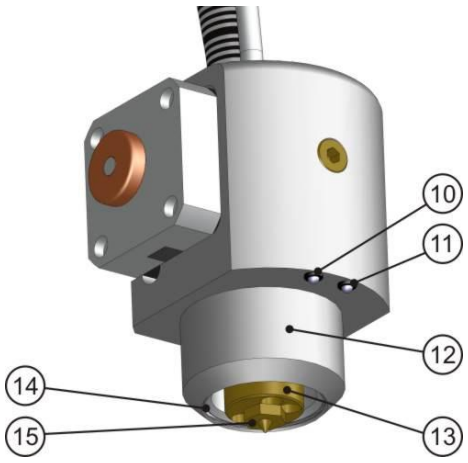
5 = Filament supply

6 = Hand wheel (filament feed manually)

7 = Step motor (filament feed)

8 = Adjustment for filament pinch roller

9 = Cooling fan with cover



10 = LED (blue)

11 = LED (red)

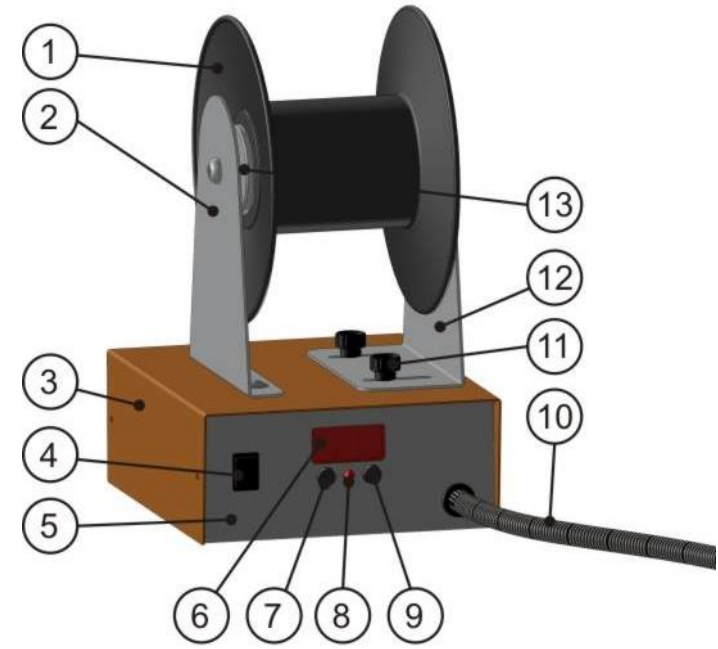
12 = 43 mm Euro neck

13 = Hot-end (including heating and temperature sensor)

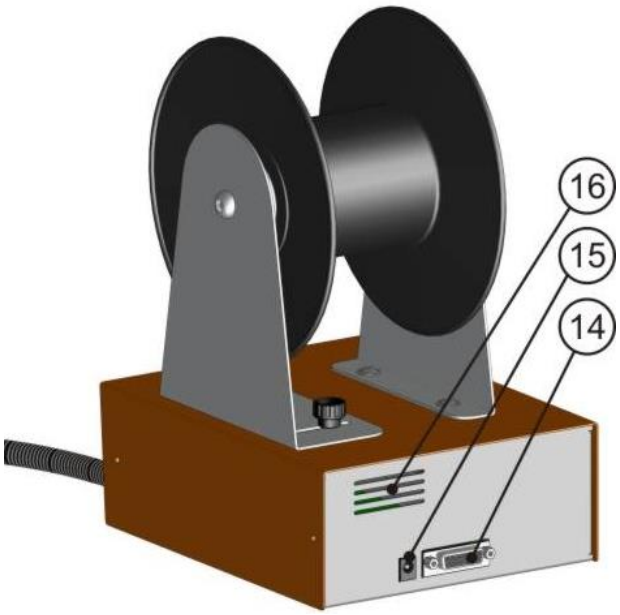
14 = Annular nozzle

3.2 Designation of the Controller Components

1 = Filament roller
2 = Roller holder (fixed)
3 = Cover
4 = Main switch
5 = Lower part of housing
6 = Temperature display
7 = Temperature setting (-)
8 = Power LED
9 = Temperature setting (+)
10 = Cable output
11 = Lock screw
12 = Filament holders (adjustable)
13 = Filament roller (with ball bearings)



14 = System connector (15 pin Sub-D female)
15 = Power supply 19V minimum 3A
16 = Vents



4 Commissioning

4.1 Clamping the Print Head

The print head is inserted without additional adapter directly into the euro-collar of the machine and easily fixed. The adjustment for the filament pinch roller (8) should be facing forward. Thus, the LEDs are visible below and the print head does not about the profile of the X-axis.

The connecting hoses of the print head should be straight out to the side so that they cannot get jammed between the guides of the machine.

4.2 Environmental Requirements

The print head should be installed in a closed space.

The ambient air around the print head should be kept dust-free. Excessive exposure to dust may cause damage to the print head.

Humidity should be within the usual levels for humidity in indoor environments. Protect the print head from moisture and humidity.

The ideal temperature of the system is between 18 ° C and 25 ° C.

Protect especially the electronics from overheating by avoiding exposure of the print head and the controller to direct sunlight or close proximity to a heater.

4.3 Electrical Connection of the Control Unit

Connect the control unit via the supplied 15-pin Sub-D connection cable to the system output of your STEPCRAFT 3D System.

The power supply has to be connected with its low voltage adapter plug marked on the rear panel power connector jack.

4.4 Optional Accessories:

If you use accessories which are not manufactured or sold by STEPCRAFT, please check compatibility with your system before the first use.

When in doubt, contact the manufacturer if necessary.

4.4.1 Print Nozzles

The print head is supplied with a print nozzle ø 0.4 mm, the following replacement nozzles are available:

- Print nozzle ø 0.3 mm
- Print nozzle ø 0.4 mm
- Print nozzle ø 0.5 mm
- Print nozzle ø 0.7 mm
- Print nozzle ø 1.0 mm

All nozzles are available in our online shop.

4.4.2 Filament

The filament should have a diameter of 1.75 mm. You can get matching filament coils with 1 kg filament in different colors and varieties in our online shop.

4.4.3 Print Table

The supplied print table is clamped by the STEPCRAFT 3D System clamping bridges on the machine table. It is made of 3 mm acrylic glass 250 mm x 150 mm.

Optionally, you can get an illuminated acrylic glass table suitable for your STEPCRAFT 3D System.

You can find this also in our online shop.

5 Operation Control / Print Head

5.1 Operator

The improper operation of the print head and the control unit can cause serious injury or property damage.

Read and observe the major accident prevention regulations!

Each user must have read and understood the available instructions for the entire system (machine, system-held tool, control, software) before operating the device for the first time.

5.2 Control

After switching on the control unit, the actual temperature of the print head is displayed (in ° C). The heating of the hot-ends immediately starts heating the filament and the print nozzle to the stored set point.

The control unit has two buttons for temperature adjustment. By pressing one of two buttons (7 or 9), the display jumps to the set point / target value. This can now be reduced with the left button (7) by 1 ° C, or increased with the right button (9) by 1 ° C. If no button is pressed for 3 seconds, the display jumps back to the actual value. You can change the set value at all times, the last set value remains saved until it is changed.

Turn the control unit off again after finishing the work from the main switch.

5.3 Print Head

!! Never touch the hot end (13) or the print nozzle (15), here there is serious risk of burns!

The two LEDs on the print head show the state of heating. The blue LED stays lit until the desired temperature is reached, then the blue LED turns off and the red LED will light up. Now the print head is ready to start and you can begin printing.

Before each run, the filament must be boosted with the arrow keys on the 4th axis until a clean thread is printed out, we call this process "exhausting". Remove the thread and then start printing. If you take a print break, bleed the system again before any further printing. Print breaks are useful for filament change (colour change), for the insertion of components (e. g. square nuts in the bags printed for them) or for checking the working piece.

The adjustment for the filament pinch roller (8) is always set to maximum pressure. To change the filament, however, this must be released. In order to restore the original settings please proceed as follows: Turn the adjusting screw as far as it will go (to the right) until it can no longer be turned. Turn the adjustment screw now a half turn to the left. Now the print roller is set correctly.

The hand wheel on the motor is used for manual insertion of the filament when the controller (STEPCRAFT 3D System) is switched off; in all other cases the stepping motor takes over the rotary motion (see also filament exchange and filament jam)

The fan is controlled by the controller via PWM signal. The intensity is controlled by the print-preparation software repeater host.

5.3.1 Nozzle Change

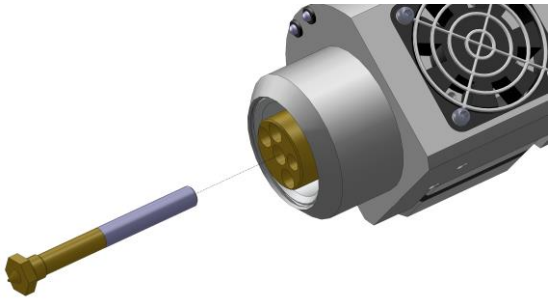
Before changing the nozzle, first remove the filament from the print head (see 5.3.2).

Before the change, turn off the controller and unplug the 15-pin Sub-D connector system.

Unscrew the old nozzle on the 10 mm key area. After that, turn down the filament guide tube from the old nozzle.

Now screw the filament guide tube into the new nozzle.

Screw the nozzle including filament guide tube in the hot-end. Now you can slide the filament into the nozzle using the hand wheel of the motor (clockwise = filament towards the nozzle).



5.3.2 *Filament Exchange*

The heating system must be turned on first and the red LED on the print head should light up.

Turn off the control of the print head.

Unscrew the adjusting screw for the filament pinch four turns.

Now pull the filament supply from the housing.

Remove the old filament and slide the new one in the filament supply hose so that it protrudes from the filament supply. Take the filament end and push it into the print head past the drive shaft into the filament guide tube.

Now insert the filament feeder to the print head.

Screw tight the adjustment of the filament pinch again, as described in 5.3.

Now, turn the control back on and allow the motor to press the new filament into the nozzle after reach operating temperature.

5.3.3 *Filament Jam*

If a filament cannot be boosted, it usually means the nozzle is clogged. Cleaning is very difficult, often a new nozzle has to be fitted.

If there is a filament jam, try to remove the nozzle and then to boost the filament. If the thread is boosted from the hot end, tear off the soft part downwards and pull the filament then upwards out of the print head.

Clean the nozzle or use a new one (see point 5.3.1).

Then run the filament again (see 5.3.2).

5.4 Filament Holder

The filament holder is adjustable in width. For a filament change unscrew the two black screws (11) all the way out and take the filament holder (12) to the side. Now you can change the filament roller. Mount the filament holder back on the cover.

The filament rollers are made for our filament rollers with a 38 mm inner diameter. The entire holder can be rotated 90 ° mounted onto the cover, this enables optimum filament unwinding, depending on where you place your controller.

5.5 Emergency Stop Switch

The emergency stop switch is located on the front of the STEPCRAFT 3D System (see diagram in point 3.1 of the kit instructions).

If you press the switch, the emergency stop is triggered. The machine must stop with immediate effect (see also point 2.7 of the kit instructions).

Press the emergency stop switch only in emergency situations

Pressing will result in immediate machine shutdown and can cause step losses and loss of data.

Controlled stopping of the machine can only be done via the control software.

To cancel the emergency stop status, turn the emergency stop switch to the right. Then the control is re-enabled. The work process must be restarted.

The entire system is controlled and operated by the PC.

Prior to first use, please read the manual of your control software completely and make sure that you have understood everything.

For questions regarding the control software, please contact the respective software developer.

6 Technical Specifications

6.1 Dimensions and Weight of Print Head

Length = 96 mm

Width = 75 mm

Weight = 0.6 Kg

Collar = 43 mm (Euro neck)

Cable length = about 80 cm

6.2 Filament Feed

The filament is fed by bipolar stepper motors. The filament is directly moved without gearbox by the motor with a pinion ø 5 mm. It is supported by a ball bearing, spring-loaded roller. By pulling out the filament cap, the feed apparatus can be cleaned easily.

6.3 Other Characteristics

3D print head 1.75	
Heating element	12V 40 Watt, PID controlled
Temperature sensor	PT100 (3 wire)
Adjustable temperature	140 ° C - 250 ° C.
Status indicator	2 x LED (blue / red)
Step motor	Bipolar 1.8 ° full step, 1.4 A
Step motor controller	3,200 steps / revolution (1/16 Step)
Filament	1.75 mm PLA, ABS, HIPS
Nozzle diameter	0.3 mm, 0.4 mm, 0.5 mm, 0.7 mm, 1.0 mm
Filament feed	0.005 mm / step
Connector receiver	43 mm Euro-neck
Fan	PWM controlled

6.4 Pin assignment of the Interface (15-pin D-sub input signals)

Pin number	Function	Pin number	Function
1	19V 3A power supply	9	19V 3A power supply
2	GND (mass)	10	GND (mass)
3	5V logic voltage	11	Not used
4	4th axis direction	12	Not used
5	4th axis phase	13	Not used
6	Not used	14	Fan on / off (5V)
7	PWM signal (fan speed selection)	15	Not used
8	Not used	---	---

6.5 Spare Parts

All parts of the print head and the controller can be purchased separately as spare parts.

To do so, please contact us directly. Our contact details can be found on the second page of this manual.

7 Transport and Storage

7.1 Transport

Please note during transport, that the print head is firmly connected to the control unit. Avoid a tensile load of the cable.

Transport the device in two parts if necessary.

7.2 Packaging

If you do not want to re-use the packaging material of the print head and the control unit, remove it properly and according to disposal conditions at the site and carry it to the recycling or disposal unit.

7.3 Storage

In case of prolonged non-use of the print head and the control unit please note the following storage conditions:

- Keep the device and the components in closed rooms
- Protect from moisture, humidity, cold, heat and direct sunlight
- Store in a dust-free environment, cover if necessary
- The storage place should be free of vibrations.

8 Maintenance

8.1 Safety

Before maintaining the 3D print head, turn off the control unit and ensure it is not unintentionally switched on again by pulling the power plug out of the controller

Maintenance work should only be carried out by technically skilled persons.

Improper handling of the device can result in a high risk of injury

8.2 Maintenance Work

To ensure continued enjoyment of your STEPCRAFT 3D print head, treat it carefully.

Regular maintenance affects the life expectancy of the device.

Please make sure you regularly carry out the maintenance/care work by:

- Cleaning the filament guide paths with a dry, soft, lint-free cloth.
- Cleaning the nozzle regularly with a fine brass brush
- Ensuring that no chips, dust, etc. pass into the filament guide paths, this would inevitably lead to a clogged nozzle

9 Disorders

9.1 Response to Malfunctions

If a failure occurs on the device that could cause personal injury or property damage, stop the operation immediately using the emergency stop switch

For less serious malfunctions, please stop the machine / device normally via the controller. If you cannot fix the malfunction yourself, please contact us, specifying the fault which has occurred.

Our contact details can be found on the second page of this manual.

10 ANNEX

10.1 NAMEPLATE

The nameplate is located on the rear of the controller.

10.2 COPYRIGHT

10.3 WARRANTY AND LIABILITY

These instructions must be read by every operator before first operating the device.

We are not liable for damages resulting from failure to observe the operating instructions. Translations into other languages may be carried out by a qualified translation company. We can accept no liability for inaccurate translations. The German language original version of the manual is definitive.

If translations into other languages are given by third parties without our knowledge we are not liable for the completeness or accuracy of the translations.

This manual has been prepared to the best of our knowledge and belief, based on our experience and knowledge.

The statutory warranty provisions apply.

10.4 DISPOSAL VIA MUNICIPAL COLLECTION

Since the device and its components contain valuable raw materials that can be recycled, do not dispose of it via household waste.

If you do not know where you can dispose of your device, you should contact your local waste management service provider or other entity entrusted (municipally) with waste disposal facilities.

You can return the device and its components, of course, to us and we will take over the management for you.

10.5 RoHS, 2002/95/EC

We confirm that the STEPCRAFT 3D print head and the control unit conform to RoHS, 2002/95/EC

11 EC Declaration of Conformity

EC manufacturer´s declaration of conformity

in terms of the directive 2006/42/EC, appendix II part 1 A

Manufacturer:	Stepcraft GmbH & Co. KG An der Beile 2 58708 Menden Germany
Type of product:	STEPCRAFT 3D print head
Type designation:	FDM 1.75

Hereby we declare, that the machine named above is consistent with the following relevant regulations:

- **EC machinery directive 2006/42/EC**
- **EC EMC directive 2004/108/EC**
- **The machine observes the protection targets of the EC low voltage directive (LVD) 2006/95/EC.**

Applied harmonized standards, whose references have been published in the Official Journal of the European Communities:

EN 61029-1	11/2010	Safety of transportable motor-operated electric tools, Part 1: General requirements

Representative for the compilation of the technical documentation is the signatory of this declaration.

This declaration becomes void, if not authorized modifications are made to the machine.

Thie EC manufacturer´s declaration of conformity was issued

in: Menden
on: 07-22-2016

by:

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