

# Operating instructions

## Desktop CNC-/3D-System STEPCRAFT 2 – 210/300/420/600/840



Original operating  
instructions

Date of: July 18<sup>th</sup> 2016



**NOTICE**

All instructions, warranties and other collateral documents are subject to change at the sole discretion of STEPCRAFT, Inc. For up-to date product literature, visit [www.stepcraft-systems.com](http://www.stepcraft-systems.com) for customers from Europe or [www.stepcraft.us](http://www.stepcraft.us) for customers from US / Canada and click on the service & support tab for this product.

**Meaning of Special Language**

The following terms are used throughout the product literature to indicate various levels of potential harm when operating this product: The purpose of safety symbols is to attract your attention to possible dangers. The safety symbols, and their explanations, deserve your careful attention and understanding. The safety warnings do not by themselves eliminate any danger. The instructions or warnings they give are not substitutes for proper accident prevention measures.

**NOTICE:** Procedures, which if not properly followed, create a possibility of physical property damage AND a little or no possibility on injury.

**CAUTION:** Procedures, which if not properly followed, create a probability of physical property damage AND a possibility of serious injury.

**WARNING:** Procedures, which if not properly followed, create a probability of property damage, collateral damage, serious injury or death OR create a high probability of superficial injury.



**Safety Alert:** Indicates warning or caution. Attention is required in order to avoid serious personal injury.



**Warning:** Read the ENTIRE instruction manual to become familiar with the features of the operating. Failure to operate the product correctly can result in damage to the product, personal property and cause serious injury.

This is a sophisticated hobby and semi-professional product for advanced craftsman with previous experience in the operation of manual guided tools such as router or computerized tools like 3D printers. It must be operated with caution and common sense and requires some basic mechanical ability. Failure to operate this product in a safe responsible manner could result in injury or damage to the product or other property. This product is not intended for use by children without direct adult supervision. Do not attempt disassembly, use with incompatible components or augment product in any way without the approval of STEPCRAFT, Inc. This manual contains instructions for safety, operation and maintenance. It is essential to read and follow all the instructions and warnings in the manual, prior to assembly, setup or use, in order to operate correctly and avoid damage or serious injury.

**Age Recommendation: For advanced handcrafters ages 14 and above. This is not a toy.**

**General Safety Precautions and Warnings**

This tool is controlled by a computer. Within operation it is outside your direct control. Missing caution or program errors can cause unexpected movement.

- Always ensure you fully understand the control program on your computer and how it affects the movement of the tool.
- Always operate your tool indoors on a solid horizontal table or workbench.
- Always carefully follow the manufacturer directions and warning for any related equipment ( i.e. milling spindles, 3D print heads, drag knives, etc.).
- Always keep the product, related tools, small parts and electrical components out of the reach of children.
- Always keep children out of the vicinity of this product well out of the reach of children.
- Always keep hair secured above your shoulders so it cannot get caught in the linear guides or the rotating tools.
- Always avoid water exposure to all equipment not specifically designed and protected for the purpose. Moisture causes damage to electronics.
- Never maintain and operate this product at poor light settings.
- Always ensure all clamping accessories for insertion tool, machine guided tool and work piece are secure before use.
- Always store product in a dry, temperate, secure location.
- Do not touch the insertion tools or motors as they can become extremely hot during use.
- Do not operate this tool outside
- Always ensure the emergency switch is properly set before operating.
- Always ensure you understand the product and how to operate it
- Only use STEPCRAFT-approved replacement parts and accessories for this product.
- Never place any portion of the tool or the related accessories in your mouth as it could cause serious injury.
- Never operate your desktop 3D system with a computer operated on battery.
- Never connect the tool unless using or testing the tool. Do not perform maintenance with the power supply installed.
- Never operate this product if you are tired, ill, taking any medications that impair judgment or are under the influence of alcohol or drugs.
- Never spray ignitable liquids or any other liquid on this product.
- Always keep hair and dangling or loose items well away from the insertion tools when the power supply is connected.

**NOTICE:** Modification with non-STEPCRAFT-approved components may result in refusal of service by STEPCRAFT.

**WARNING:** This is a desktop 3D-system that can hold tools with sharp blades that spin at very high RPM or tools getting really hot. Always use extreme caution and common sense when maintaining and operating this product. If you are unsure about ANY function or procedure described in this manual, DO NOT operate. Contact STEPCRAFT product support for assistance.

**WARNING:** Always ensure you are operating the tool a safe distance, 3 feet (1 meter), away from yourself and others.

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## 1 GENERAL NOTES

### 1.1 INFORMATION AND EXPLANATIONS FOR THE OPERATING INSTRUCTIONS

This manual serves to make you familiar with a desktop CNC-/3D-system and to impart you all necessary information which you require in order to be able to operate the machine safely and professionally.

This manual is applicable for the desktop CNC-/3D-systems STEPCRAFT 210, STEPCRAFT 300, STEPCRAFT 420, STEPCRAFT 600 and STEPCRAFT 840, hereafter referred to as STEPCRAFT.

Please read this manual completely before the first commissioning of your machine.

**CAUTION:** In order to minimize the risks of injury and/or material damages please only commission the machine and the corresponding control when you are sure that you have completely understood these instructions!

Please contact us for any further questions. Please find our contact data on item 10.3 of these instructions.

Please always keep these instructions nearby the machine. You should always have them readily to hand when you want to look up something.

**CAUTION:** Please only use this machine according to its intended use (refer to item 1.4).

We cannot be held liable for persons or material damages which are caused by using the machine other than the intended use, handling which does not comply with the common use of a CNC machine or if safety regulations are not obeyed (refer to item 2).

In case of lacking maintenance (refer to item 8) and/or wrong operation of the individual components your warranty claims are omitted.

We reserve the right to perform future technical enhancements on the machine and its components.

### 1.2 ADDITIONAL INSTRUCTIONS / MANUALS

**NOTICE:** Beside the operating instructions there are two additional documents available:

- **Assembly manual** – refer to this document if you must assemble the machine or if you need to assemble a spare part
- **First steps** – refer to this document before you operate the machine the first time. The document explains the installation process of the software and guides you to your first work piece (milling).

**CAUTION:** If you are not familiar with computerized tools you should go through the First steps guide step by step BEFORE first commissioning.

### 1.3 DESCRIPTION OF THE MACHINE

The STEPCRAFT machines are desktop CNC-/3D-systems for machining wood, plastics or nonferrous metals. The systems are based on a specially developed aluminum extrusion containing numerous functions (e.g. guiding, drive, protection against dust, etc.). It is very stable and torsion-resistant due to its angular shape.

The machine has three axes which are offset by 90°. In this way it is possible to travel to any point within the working range. Each axis is equipped with a stepper motor and a reference switch. The stepper motor precisely drives the mobile axes elements by means of a threaded spindle. It is possible to use the control in order to adjust the position of the axis with the help of the reference switch.

The machine table consists of a High Pressure Laminate (HPL) with a thickness of 8.0 mm. You can fix the work piece directly on the table with the clamping system delivered.

The STEPCRAFT-System consists of different central components. In order to use a ready-to-operate CNC machine the following additional components are required:

1. Control / main board (integrated, see connection panel on the back of the machine) with USB- or parallel module
2. System-guided tools with a shank diameter of 43.0 mm / 1.69 inch, e.g. a milling spindle, drag knife, 3D print head, or any other tool with a shank diameter of less than 43 mm / 1.69 inch with a suitable clamping adapter, i.e. CNC plotter pen.

3. Control software with cycle direction output signals, i.e. WinPC-NC or UCCNC
4. Suitable PC
5. Connection cable

Please find further information for optional accessory under item 5.6 of these instructions.

## 1.4 INTENDED USE

The STEPCRAFT machine series is designed for private users (e.g. model-makers) and piece productions or productions of small series in the industrial area. It is not suitable for the production of large series or to integrate it in production lines

The torsion-resistant structure allows to process plastic materials, wood and non-ferrous metals. The following manufacturing methods are possible:

- Machining, i.e. milling, plotting, cutting, engraving, scratching
- Generative manufacturing process like 3D printing
- Every type of process that requires a precise 3D positioning, i.e. measuring, dosing

## 2 SAFETY

Beside the general safety precautions and warnings there are additional safety notes important to consider.

### 2.1 GENERAL NOTES

**CAUTION:** Please read this manual completely before the first commissioning of your machine! Any person operating this machine must have read these instructions! In order to minimize the risks of injury and/or material damages only operate the machine and the corresponding control when you are sure that you have completely understood the instructions!

Please do not hesitate to contact us for any further questions. Please find our contact data in item 10.1 of these instructions.

Please always keep these instructions nearby the machine. You should always have them readily to hand when you want to look up something.



**WARNING:** Please only use this machine according to its intended use (refer to item 1.3). If the machine is not used as intended there is a risk for persons and of material damages!

**NOTICE:** It is not allowed to modify and/or retrofit the machine unless this has been expressly authorized by us in individual cases.

The STEPCRAFT is designed and constructed according to the currently applicable state-of-the-art.

### 2.2 RESPONSIBILITY OF THE OPERATOR AND WORKING SAFETY

When you operate the machine you should have the minimum age of 14 years and be technically experienced.

Always keep children out of the vicinity of this product well out of the reach of children.

Being the operator you are responsible that you have read and understood all relevant operating instructions of the machine and all relevant accessories and to keep them nearby the machine.

**CAUTION:** You have to make sure that you operate the machine only when it is in a technically proper status.



**WARNING:** The emergency-stop switch and if applicable other safety equipment must always be well attainable and operable.

**CAUTION:** Being the operator you have to wear the personal protective equipment described under item 2.3 when you work on the machine.



**WARNING:**

- In particular when performing setting works on the machine or the control or on the system-guided tools, i.e. milling spindle, 3D print head, please disconnect the machine from the mains!
- Do not touch the insertion tools or motors as they can become extremely hot during use.
- Always make sure to have sufficient clearance to the mobile parts (guiding, milling cutters, shafts) and never grasp with your hand into the machine. This may result in severe injuries!
- Never hold the work piece (in order to measure it to process it or for any other purposes) while the machine is running. There is a high risk of injury!
- Never hold the work piece to be processed only with the hand but always firmly clamp the work piece. Otherwise there is a high risk of injury!

Depending on the field of application of the machine (private or industrial use) please observe the correspondingly applicable regulations for occupational safety, safety and accident prevention as well as environmental protection.

### 2.3 PERSONAL PROTECTIVE EQUIPMENT



**WARNING:** While working with the machine, wearing of safety glasses as well as safety gloves is prescribed and necessary!

- Safety goggles (to protect the eyes against chips flying off at high speed, etc.)
- Protective gloves (to protect the hands against cuts, abrasions, etc.)

Furthermore do not wear any clothes which might get caught in the machine (ties, scarves, shawl, wide sleeves, etc.) and do not wear any jewelry in particular no long chains and rings.

**CAUTION:** Milling jobs can cause a lot of noise. Wear hear protection to protect the ears against hearing damages!

### 2.4 ENVIRONMENTAL CONDITIONS

The machine is only suitable to be operated inside!

**NOTICE:** Position the machine on a solid plane substructure in order that it stands safely and can neither slip nor tilt over.

Make sure that there is sufficient space around the machine in order that you can work comfortably and that the machine can fully extend to its traveling paths. Also keep sufficient clearance to possibly nearby positioned machines.

Provide for sufficient illumination of the machine site and the working place surrounding the machine.

Place the PC which controls the machine nearby the machine so that you can have an eye on both.

All instructions for the machine and its components must be nearby.

Always avoid water exposure to all equipment not specifically designed and protected for the purpose. Moisture causes damage to electronics.

Store the system and all components in a dry and warm environment between 18°C to 25°C, from 64°F to 77°F respectively.

### 2.5 COMMISSIONING OF THE SYSTEM CONTROL AND THE SYSTEM-GUIDED TOOLS



**WARNING:** In order to safely and professionally commission the electronic control of the system and possibly additionally built-in components, please imperatively read the operating instructions of the individual components completely before the first commissioning of the whole system.



**WARNING:** Always check the emergency-stop switch before operating the machine (see item 2.7) and don't rely on the start/stop function of the control software exclusively.

Check if the individual components are perfectly connected with each other before the first commissioning and in regular intervals later on.



Furthermore, check before each use of your machine if it is supplied with current and if required if the compressed air is working perfectly.

**NOTICE:** Don't connect the machine to the computer if you don't intend to use the machine.


**CAUTION:** Always ensure all clamping accessories for insertion tool, machine guided tool and work piece are secure before use.

## 2.6 OPERATOR

The person operating the machine should be not less than 14 years old and technically experienced.

All persons operating the machine must have completely read and understood all relevant operating instructions.

Each operator must get familiar with the electronic control of the machine as well as with the used control software before the first use of the machine.


 **WARNING:** Each operator must have personal protective equipment.

Each operator must operate the machine and its components with due prudence and due expertise which is necessary for the use of CNC controlled milling machines.


## 2.7 EMERGENCY-STOP SWITCH

The emergency-stop switch is located at the front side of the machine (refer to the schematics under item 3.1 of these operating instructions).

The Emergency-Stop is released by pressing the switch. In this way the power supply of the control is interrupted. Furthermore, the control software receives the signal to stop the working process. The machine stops immediately.

 **WARNING:** The emergency-stop switch can only affect the standstill of all components if they are connected. This is ensured if you use the milling spindles and the controller made by STEPCRAFT.

**CAUTION:** If you use any third party products such as e.g. another controller you are responsible yourself to connect the Emergency-Stop switch professionally with your controller. Otherwise there is a risk for persons and material damages! Also if you would like to use a system-guided tool like a milling spindle of another supplier which is equipped with a separate ON/OFF switch and is NOT controlled via the PC you have to make sure that it is professionally connected to the emergency-stop switch.

 **WARNING:** If you do not observe this it will continue running even if you actuate the emergency-stop switch. Also here there is a risk for persons or material damages!

Please do not hesitate to contact us for any further questions!

Please find further information regarding the Emergency-Stop switch under item 5.4 of these instructions.

## 2.8 REMAINING RISK

**CAUTION:** In spite of all preventive measures there is always a remaining risk for persons and material. Therefore, operate the machine and its components circumspectly and carefully!

Make sure that you are working concentrated and that you are not tired.

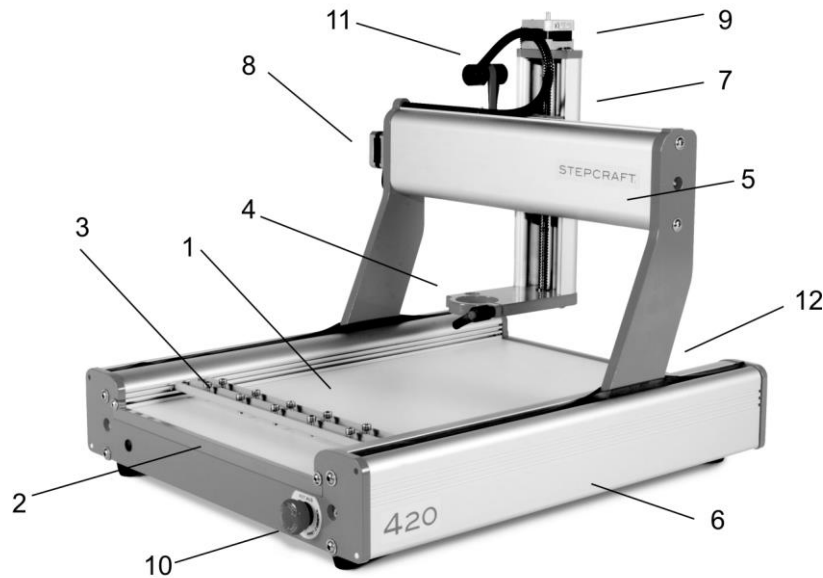
Do not operate the machine and its components if you are under the influence of medication, alcohol or drugs.

# 3 STRUCTURE AND FUNCTION

## 3.1 DESIGNATION AND FUNCTIONS OF THE COMPONENT PARTS

- 1= Machine table to fix work pieces on it using a suitable fixture
- 2 = Attachment bracket for the machine table
- 3 = Integrated clamping system to fix appropriate sheet material

- 4 = 43.0 mm / 1.69 inch tool seat e.g. for milling spindle, hot cutter, engraving point
- 5 = X-axis guiding for driving and axis guiding
- 6 = Y-axis guiding for driving and axis guiding, incl. inspection flap for cleaning and maintenance
- 7 = Z-axis guiding for driving and axis guiding
- 8 = Step motor X-axis to move the slide of the X-axis
- 9 = Step motor Z-axis to move the slide of the Z-axis
- 10= Emergency-Stop switch to stop the machine quickly (only in emergency situations)
- 11 = Cable collector to cover X- and Z-motor/limit switch cable
- 12 = Backside of the machine with connector block for power supply and computer



## 4 COMMISSIONING

### 4.1 INSTALLING THE MACHINE

The machine must be positioned on an absolutely level even working table so that it stands safely and can neither slip nor tilt over.

All mobile parts of the machine must have sufficient space in order that they can be moved without collisions.

The cable duct of the system-guided tool e.g. the milling spindle must be designed in a way that the spindle cable is not being clamped between the guide ways of the machine.

It is necessary to well attain and operate the machine.

**CAUTION:** It is in particular necessary to reach the Emergency-Stop switch at any time; it must not be obstructed.

Provide for sufficient illumination of the machine site and the working place surrounding the machine.

Place the PC which controls the machine nearby the machine so that you can have an eye on both.

### 4.2 ENVIRONMENTAL CONDITIONS

Install the machine in a closed room.

Keep the environmental temperature of the machine dust-free. Too high dust loading can cause damages on the system.

The humidity should be within normal limits for humidity content inside. Protect the machine against wetness and humidity.

The perfect environmental temperature for the system is from 18°C to 25°C, from 64°F to 77°F respectively.

In particular protect the controller against overheating by avoiding direct sun radiation or indirect heating up nearby a radiator.

### 4.3 ELECTRICAL CONNECTION OF THE MACHINE

The connection of the stepping motors, the end switches and the emergency-stop switch has to be processed conform to the construction manual enclosed.

The low-voltage plug of the power supply has to be connected to the connection socket of the unit control at the backside of the machine.

The computer will be connected to the desktop 3D-system with an USB- or parallel connection cable. The necessary socket is located at the backside of the machine, too. Depending on the variant of interface module there is either an USB- or a parallel socket.

The LED lights of the unit control are visible from the outside. The LED lights flash in case of:

Control light	Impact
LED1	System ok / power amplifier switched on / emergency-stop switch switched off
LED2	Power on / 5V DC

### 4.4 OPTIONAL ACCESSORY

**CAUTION:** If you use any accessory which was not made or sold by STEPCRAFT please check if it is compatible with your system before the first use.

In case of doubts please contact the corresponding manufacturer, if required.

#### 4.4.1 SYSTEM-GUIDED TOOLS

**CAUTION:** Please read the operating instructions of every single system-guided tool before use!

In addition please observe the following items:

The machine is equipped with a 43 mm / 1.69 inch tool holder with a thickness of 10 to 12 mm, of 0.39 to 0.48 inch respectively. The supply line of the system-guided tool (if applicable) is fixed to the cable collector of the X-/Z-axis and there it is forwarded by means of a "flying" guiding.

Please imperatively make sure that the supply line is long enough and won't be clamped anywhere.

The following original system-guided tools are available today:

Accessory	Description
HF-spindle	Spindle for milling and engraving for a huge variety of materials, i.e. wood, plastic or non-ferrous metals like brass or aluminum
3D print head	Head for generative manufacturing with plastic filament like PLA or ABS. Type of process: Fused Deposition Modeling (FDM)
Cutter holder / foil knife	Tool for cutting foils and paper
Hot cutter	Cutter for styrofoam. Works with a hot wire.
CNC pen	Special holder for ball pens to draw on paper, fabric etc.
Engraving point	Tool is to be able to scratch minimum details in plastic, brass, copper, aluminum, steel, high-grade steel

#### 4.4.2 ADDITIONAL ACCESSORY

When using accessories please always make sure to have the additional operating instructions of the corresponding products and check if the parts are compatible to the STEPCRAFT desktop 3D-system and to the control before using them for the first time.

The following original accessories are available:

Accessory	Description
Tool length sensor	Sensor to measure the bottom edge of the end mill in a spindle
Circular table and tailstock	4 <sup>th</sup> axis CNC milling to process cylindrical work pieces
Exhaust adapter	Collector for dust and chips
Heating bed*	Heated machine table for 3D printing, necessary for ABS plastic
Vacuum table*	Machine table to fix thin materials like foils, plastic sheets
Clamping accessories	Variety of clamping accessories like adapters, steel vices, rubber work piece holder, aluminum T-slot table

\*Third party supplier

## 4.5 MACHINE TABLE

The machine table consists of a High Pressure Laminate (HPL) with a thickness of 8.0 mm / 0.31 inch.

The machine table can be easily replaced. It is possible to pull out the table to the front by removing the attachment bracket with the two relevant screws (see item 3.1, position 2).

Dimensions of the original machine table:

Typ of machine	Length	Width	Thickness
<b>STPCRAFT 210</b>	290 mm / 11.4 inch	222 mm / 8.3 inch	8 mm / 0.31 inch
<b>STPCRAFT 300</b>	380 mm / 14.96 inch	234 mm / 9.21 inch	8 mm / 0.31 inch
<b>STPCRAFT 420</b>	500 mm / 19.69 inch	324 mm / 12.76 inch	8 mm / 0.31 inch
<b>STPCRAFT 600</b>	680 mm / 26.77 inch	444 mm / 17.48 inch	8 mm / 0.31 inch
<b>STPCRAFT 840</b>	920 mm / 36.2 inch	624 mm / 24.57 inch	8 mm / 0.31 inch

## 5 MACHINE OPERATION

### 5.1 OPERATOR



**WARNING:** The improper operation of the machine and its components can result in severe injuries or material damages. Therefore, please observe the accident prevention regulations!

**CAUTION:** Before the first use of the machine each operator must have read and understood the existing instructions for the whole system (machine, system-guided tool, control, software).

### 5.2 WORK PIECE

The work piece can be directly fixed on the machine table by means of the integrated clamping system. Alternatively e.g. a steel vice can be fixed on the machine table.

In case of through-milling (cutouts) it is recommended to position a MDF plate with a thickness of 6.0 mm / 0.24 inch underneath the work piece in order to avoid damages on the machine table.

**NOTICE:** The work piece should be sufficiently fixed in order to avoid unintentional slipping while processing it.




**WARNING:** Never hold the work piece only with the hand during the processing. There is a severe risk of injury!

Admissible work piece size:

Type of machine	Clamping length	Clamping width
<b>STEEPCRAFT 210</b>	290 mm / 11.4 inch	210 mm / 8.3 inch
<b>STEEPCRAFT 300</b>	380 mm / 14.96 inch	222 mm / 8.74 inch
<b>STEEPCRAFT 420</b>	500 mm / 19.69 inch	312 mm / 12.28 inch
<b>STEEPCRAFT 600</b>	680 mm / 26.77 inch	432 mm / 17.01 inch
<b>STEEPCRAFT 840</b>	920 mm / 24.2 inch	615 mm / 36.2 inch

### 5.3 SYSTEM-GUIDED TOOLS


CAUTION: Please observe the corresponding operating instructions of your individual tool!

 **WARNING:** Never touch the tool then the system is running! There is a severe risk of injury like cuts, abrasions, skin burns etc.

#### 5.3.1 DRILLING / MILLING SPINDLE

**CAUTION:** Switch off the drilling / milling spindle by pressing the corresponding switch (if available) and secure it against restarting. If the drilling / milling spindle is equipped with a proper mains plug please disconnect it from the mains!

**CAUTION:** Always take the milling cutter out of the milling motor when working on the work piece (e.g. clamping, replacing) otherwise there is a risk that you get injured when touching the milling cutter!

 **WARNING:** Never touch the end mill! There is a severe risk of injury like cuts, abrasions, skin burns etc.


#### 5.3.2 CUTTING KNIFE

**CAUTION:** Always take the blade out of the cutting knife when working on the work piece (e.g. clamping, replacing) otherwise there is a risk that you get injured when touching the blade!

**NOTICE:** Never touch the tool then the system is running! There is a risk of injury like cuts etc.

#### 5.3.3 HOT CUTTER

**CAUTION:** Switch off the hot cutter by pressing the corresponding switch (if available). If the hot cutter is equipped with a proper mains plug please disconnect it from the mains!


 **WARNING:** Never touch/draw the red-hot wire! There is a severe risk of injury like skin burns etc.

#### 5.3.4 ENGRAVING POINT / PLOTTER PEN

**NOTICE:** Always take the engraving point out of the tool holder when working on the work piece (e.g. clamping, replacing) otherwise there is a risk that you get injured when touching the engraving point!

#### 5.3.5 3D PRINT HEAD

**CAUTION:** Switch off the 3D print head by pressing the corresponding switch (if available) and secure it against loosing hot filament. If the 3D print head is equipped with a proper mains plug please disconnect it from the mains!

 **WARNING:** Never touch/draw the 3D print head! There is a severe risk of injury like skin burns etc.

**NOTICE:** Use additional handheld tools to remove hot filament from the machine table or the print head. Never touch/draw the hot print head there is a severe risk of injury!

## 5.4 EMERGENCY-STOP SWITCH

The Emergency-Stop switch is located at the front side of the machine (refer to the schematics under item 3.1 of these instructions).

If you press the switch the Emergency-Stop is released. The machine stops immediately (imperatively refer to item 2.7 of these instructions).

**NOTICE:** Only press the Emergency-Stop switch in emergency situations!

If the switch is pressed it results in an immediate machine standstill and can result in step losses and data losses.

A controlled stopping of the machine can only be performed by means of the control software.

In order to undo the Emergency-Stop status turn the Emergency-Stop switch to the right. Thus the control is reactivated. The working process has to be restarted.

## 5.5 OPERATION OF THE SYSTEM / OPERATING ELEMENTS

The whole system is controlled and operated by means of a computer or laptop (PC).

The minimum requirements are:

- Processor / CPU with 1 GHz
- 32 or 64 bit operating systems Windows® XP, Vista, 7 or 8
- USB 2.0 interface (no hubs / no USB connection cable longer than 5m / 15 ft.)
- Standard PC peripheral devices (monitor, graphic card etc.)
- Deactivation of power saving function, hard disk shutdown, frequency reduction



**WARNING:** Please completely read the manual of your control software before the first commissioning and make sure that you understood everything.

For any further questions regarding the control software please contact the corresponding software developer.

## 5.6 OPTIONAL ACCESSORY

Please find additional accessories in our online shop at [www.stepcraft-systems.com](http://www.stepcraft-systems.com) or [www.stepcraft.us](http://www.stepcraft.us) of your STEPCRAFT such as:

- System-guided tools, e.g. drilling / milling spindle, cutting knife, plotter pen, engraving point, hot cutter, 3D print heads
- Extension of the modular unit control e.g. the 4<sup>th</sup> axis module together with the CNC rotary table
- Grooved plate (aluminium) or systems for mounting and clamping e.g. bench vice, clamping claws
- Tools for drilling / milling and many more

# 6 TECHNICAL DATA

## 6.1 DIMENSIONS AND WEIGHT

Type of machine	Overall size (Length x Width x Height)	Travel distance	Weight
<b>STPCRAFT 210</b>	340 x 342 x 350 mm 13.39 x 13.47 x 13.78 inch	210 x 210 x 40 mm 8.3 x 8.3 x 1.57 inch	11,0 kg 20.5 lbs
<b>STPCRAFT 300</b>	430 x 345 x 410 mm 16.93 x 13.58 x 15.75 inch	300 x 210 x 80* mm 11.81 x 8.27 x 3.15	13,0 kg 20.5 lbs

Type of machine	Overall size (Length x Width x Height)	Travel distance	Weight
		inch	
<b>STPCRAFT 420</b>	552 x 440 x 510 mm 21.46 x 17.13 x 15.75 inch	420 x 300 x 140* mm 16.54 x 11.81 x 3.15 inch	15,0 kg 24.5 lbs
<b>STPCRAFT 600</b>	737 x 558 x 510 mm 28.74 x 21.77 x 15.75 inch	600 x 420 x 140* mm 23.62 x 16.54 x 3.15 inch	19,0 kg 35.6 lbs
<b>STPCRAFT 840</b>	968 x 745 x 510 mm 38.1 x 29.3 x 20.08 inch	840 x 600 x 140* mm 11.81 x 8.27 x 3.15 inch	31,0 kg 57.66 lbs

\* For constructional reasons the travel distance of the Z-axis is getting reduced at the end positions of the X-axis by 10 mm / 0.39 inch.

## 6.2 DRIVE OF THE MACHINE

The axes of the machine are driven by means of bipolar stepper motors. All used motors have 1.8°/full step. They are connected to the drive shafts via axial coupling.

The machine is equipped with round threaded spindles TR8x2 with a feed/rotation of 2.0 mm (STPCRAFT 210) or TR10x3 with a feed/rotation of 3.0 mm (STPCRAFT 300 to 840).

Type of machine	Thread	X-axis	Y-axis	Z-axis
<b>STPCRAFT 210</b>	8x2 mm	1,4 A	1,8 A	1,4 A
<b>STPCRAFT 300</b> to <b>STPCRAFT 840</b>	10x3 mm	1,4 A	1,8 A	1,4 A

## 6.3 OTHER SPECIFICATIONS

	STPCRAFT 210	STPCRAFT 300	STPCRAFT 420	STPCRAFT 600	STPCRAFT 840
<b>Clamping surface (X Y)</b>	222 x 290 mm 8.74 x 14.42 inch	222 x 380 mm 8.74 x 14.96 inch	312 x 500 mm 12.28 x 19.69 inch	432 x 680 mm 17.01 x 26.77 inch	612 x 920 mm 24.09 x 36.22 inch
<b>Working space (X Y Z)</b>	210 x 210 x 40 mm 8.27 x 8.27 x 1.57 inch	210 x 300 x 80* mm 8.27 x 11.81 x 3.15 inch	300 x 420 x 140* mm 11.81 x 16.54 x 5.51 inch	420 x 600 x 140* mm 16.54 x 23.62 x 5.51 inch	600 x 840 x 140* mm 23.62 x 33.07 x 5.51 inch
<b>Passage height</b>	95 mm 3.74 inch	115 mm 4.53 inch	175 mm 6.89 inch	175 mm 6.89 inch	175 mm 6.89 inch
<b>Torsional stiffness (20N) (X Y Z)</b>	0,07 mm – 0,12 mm	0,06 mm – 0,11 mm	0,06 mm – 0,11 mm	0,09 mm – 0,13 mm	0,10 mm – 0,14 mm
<b>Repeatability</b>	+/- 0,04 mm	+/- 0,04 mm	+/- 0,04 mm	+/- 0,05 mm	+/- 0,05 mm
<b>Programmable resolution</b>	0,005 mm	0,005 mm	0,005 mm	0,005 mm	0,005 mm
<b>Backlash</b>	approx. 0,08 mm (with software adjustable to 0,00 mm)	approx. 0,08 mm (with software adjustable to 0,00 mm)	approx. 0,08 mm (with software adjustable to 0,00 mm)	approx. 0,08 mm (with software adjustable to 0,00 mm)	approx. 0,08 mm (with software adjustable to 0,00 mm)
<b>Maximum speed</b>	1.800 mm/min 70.87 inch/min	3.000 mm/min 118.11 inch/min	3.000 mm/min 118.11 inch/min	3.000 mm/min 118.11 inch/min	3.000 mm/min 118.11 inch/min
<b>Spindle</b>	Round-Thread spindle 8x2	Round-Thread spindle 10x3	Round-Thread spindle 10x3	Round-Thread spindle 10x3	Round-Thread spindle 10x3
<b>Linear guide</b>	STPCRAFT-aluminium profile (EN AW-	STPCRAFT-aluminium profile (EN AW-	STPCRAFT-aluminium profile (EN AW-	STPCRAFT-aluminium profile (EN AW-	STPCRAFT-aluminium profile (EN AW-

	STEPCRAFT 210	STEPCRAFT 300	STEPCRAFT 420	STEPCRAFT 600	STEPCRAFT 840
	6063 T66) with roller guides	6063 T66) with roller guides	6063 T66) with roller guides	6063 T66) with roller guides	6063 T66) with roller guides
<b>Drive</b>	Stepper motors	Stepper motors	Stepper motors	Stepper motors	Stepper motors
<b>Tool holder</b>	Ø 43 mm / 1.69 inch (optional smaller diameters)	Ø 43 mm / 1.69 inch (optional smaller diameters)	Ø 43 mm / 1.69 inch (optional smaller diameters)	Ø 43 mm / 1.69 inch (optional smaller diameters)	Ø 43 mm / 1.69 inch (optional smaller diameters)
<b>Overall size</b>	340 mm x 345 mm x 350 mm 13.39 x 13.58 x 13.78 inch	430 mm x 350 mm x 410 mm 16.93 x 13.78 x 16.14inch	550 mm x 450 mm x 510 mm 21.65 x 16.93x 20.08 inch	730 mm x 570 mm x 510 mm 28.74 x 22.44 x 20.08 inch	970 mm x 750 mm x 510 mm 38.19 x 29.53 x 20.08 inch
<b>Weight</b>	11 kg 24.25 lbs	13 kg 28.66 lbs	15.0 kg 33.07 lbs	19,0 kg 41.89 lbs	31 kg 68.34 lbs
<b>Machine table</b>	HPL	HPL	HPL	HPL	HPL
<b>Color</b>	STEPCRAFT orange, Aluminum, white	STEPCRAFT orange, Aluminum, white	STEPCRAFT orange, Aluminum, white	STEPCRAFT orange, Aluminum, white	STEPCRAFT orange, Aluminum, white
<b>Input voltage (AC)</b>	100 – 240 V	100 – 240 V	100 – 240 V	100 – 240 V	100 – 240 V
<b>Output voltage (DC)</b>	19 V	30 V	30 V	30 V	30 V
<b>Power consumption</b>	90 W	90 W	90 W	90 W	90 W
<b>Interface</b>	USB or parallel	USB or parallel	USB or parallel	USB or parallel	USB or parallel

\* For constructional reasons the travel distance of the Z-axis is getting reduced at the end positions of the X-axis by 10 mm / 0.39 inch.

## 6.4 SPARE PARTS

All parts of the machine and control can be purchased individually as spare parts.

Please contact us directly. Please find our contact data on item 10.3 of these instructions.

Please keep your machine data ready at hand when ordering spare parts.

## 6.5 PIN ASSIGNMENT CHARTS OF UNIT CONTROL / OPTIONAL MODULES

### 6.5.1 PARALLEL PORT LPT-ADAPTER (X1)

Connection of the computer to the unit control via parallel module (optional):

Signal	Pin
Relay 1	1
Direction X	2
Step X	3
Direction Y	4
Step Y	5
Direction Z	6
Step Z	7
Direction 4th axis	8
Step 4th axis	9
Tool length sensor	10
Emergency stop	11
Reference switch X/Y/Z	12
Reference switch 4th axis	13



Signal	Pin
Relay 2	14
n.a. (In)	15
Relay 3	16
n.a. (out)	17
GND	18-25
PE	shed
5V / VCC	

### 6.5.2 CONNECTOR EXTERNAL SIGNALS / SUB-D 15 (X2)

Connection of external devices to the unit control:

Signal	Pin	Input / Output
19V / 30V VCC	1	Output
GND	2	Output
+5V / VCC Logic	3	Output
Direction 4th axis	4	Output
Step 4th axis	5	Output
Relay 2	6	Output
PW M	7	Output
Tool length sensor	8	Input
19V / 30V VCC	9	Output
GND	10	Output
Disable	11	Input
Reference switch 4th axis	12	Input
Relay 1	13	Output
Relay 2	14	Output
Enclosure	15	Input
PE	shed	

### 6.5.3 CONNECTOR 4TH AXIS / SUB-D 9 (X101)

Connection of motor and reference switch of the 4<sup>th</sup> axis (optional):

Signal	Pin
Winding 1A	1
Winding 1B	2
n.a.	3
n.a.	4
Reference switch 4th axis	5
Winding 2A	6
Winding 2B	7
n.a.	8
GND	9
PE	shed

## 7 TRANSPORTATION / STORAGE

### 7.1 TRANSPORTATION

**NOTICE:** Please observe that the machine is very heavy and bulky when transporting it.

If necessary transport the machine with the help of a second person.

Please only use suitable transportation vehicles and carriers for transportation.



**WARNING:** Never lift heavy loads above people!

### 7.2 PACKAGING

When you do not want to reuse the packaging material of the machine and of its components please separate it according to the disposal conditions on site and take it to a collection center for recycling or dispose of it.

### 7.3 STORAGE

If the machine or its components is not used for a longer time please note the following for the storage:

- Store the machine and the components only in closed rooms
- Protect it against humidity, wetness, cold, heat and direct sun radiation
- Store it dust-free, cover it, if required
- The storage place must not be subject to vibrations

## 8 MAINTENANCE

### 8.1 SAFETY



**WARNING:** Before performing maintenance works on the machine switch it off and secure it against unintended restarting by disconnecting the mains switch of the controller!



**WARNING:** Before you use a system-guided tool with its own mains plug disconnect it also!

**NOTICE:** All maintenance works must only be performed by a technically experienced person.

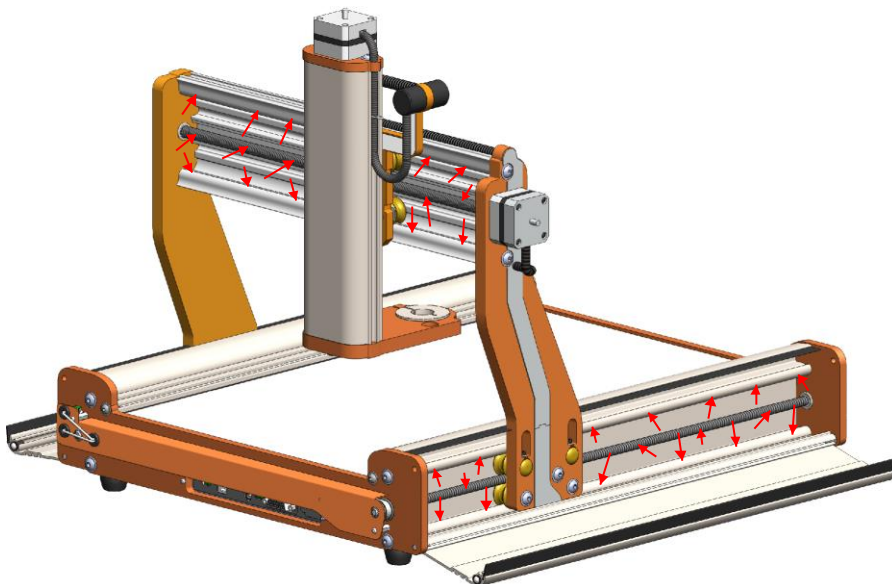
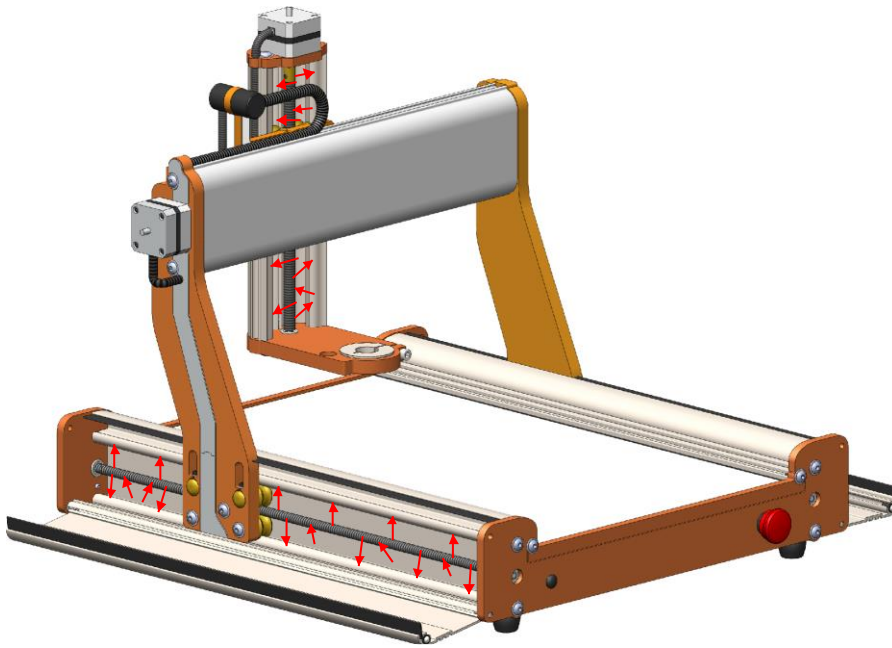


**WARNING:** In case of improper handling of the machine there is a high risk of injury!

### 8.2 MAINTENANCE WORKS

**NOTICE:** Always thoroughly handle your STEPCRAFT in order to enjoy working with it for a long time. Regular maintenance crucially influences the service life of your machine.

Therefore please perform the following maintenance:



Lubrication of linear tracks and lead screws must be carried out with supplied grease from STEP CRAFT: Klüber Microlube GL 261 or other with similar specifications.

Apply grease on positions marked as mentioned:

1. All guide areas have to be adequately greased before the machine can be put into service
2. After 20 operating hours wipe the guide area clean and apply grease again
3. Repeat step 2 if soiled but latest every 20 hours.

Also always keep the machine clean. Any accruing chips or other soiling should be sucked off or thrown away after each working step. Furthermore, please make sure that no chips or similar means get caught in the mobile parts.

## 9 MALFUNCTIONS

### 9.1 BEHAVIOR IN CASE OF MALFUNCTIONS

**CAUTION:** If a malfunction occurs on the system which might cause person or material damages please immediately stop the working process by pressing the emergency-stop switch!

In case of slight malfunctions please stop the machine as usual using the control.

If you are not able to remedy the malfunction yourself please contact us by indicating the malfunction which occurred. Please find our contact data on item 10.3 of these instructions.

## 10 ANNEX

### 10.1 WARRANTY AND SERVICE CONTACT INFORMATION

Country of Purchase	STEPCRAFT	Address	Phone No. / Email Address
United States of America	STEPCRAFT Inc.	733 E Main St. Unit 3 Torrington, CT, 06790	+1 203 556 1856 info@stepcraft.us
Germany	STEPCRAFT GmbH & Co. KG	An der Beile 2 58708 Menden Germany	+49 2373 179 1160 info@stepcraft-systems.com
Rest of World	Local distributor	see <a href="https://www.stepcraft-systems.com/en/retail">https://www.stepcraft-systems.com/en/retail</a>	see <a href="https://www.stepcraft-systems.com/en/retail">https://www.stepcraft-systems.com/en/retail</a>
	STEPCRAFT GmbH & Co. KG	An der Beile 2 58708 Menden Germany	+49 2373 179 1160 info@stepcraft-systems.com

### 10.2 MANUFACTURER

STEPCRAFT GmbH & Co. KG  
An der Beile 2  
58708 Menden  
Germany

Phone: +49 (0) 2373 –179 11 60  
E-Mail: info@stepcraft-systems.com  
Website: www.stepcraft-systems.com

### 10.3 TYPE PLATE

The type plate is at the left side of the machine on the inspection flap.

Example:



## 10.4 COPYRIGHT

The contents of these operating instructions are the intellectual property of the company STEPCRAFT. Forwarding or copying (also in excerpts) is not allowed unless we authorized it expressly in writing. Any infringements are prosecuted.

## 10.5 LIMITED WARRANTY

### What this Warranty Covers

STEPCRAFT GmbH & Co. KG ("STEPCRAFT") warrants to the original purchaser that the product purchased (the "Product") will be free from defects in materials and workmanship at the date of purchase.

### What is not covered

This warranty is not transferable and does not cover (i) cosmetic damage, (ii) damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or due to improper use, installation, operation or maintenance, (iii) modification of or to any part of the Product, (iv) attempted service by anyone other than a STEPCRAFT authorized service center, (v) Product not purchased from an authorized STEPCRAFT dealer, or (vi) Product not compliant with applicable technical regulations.

OTHER THAN THE EXPRESS WARRANTY ABOVE, STEPCRAFT MAKES NO OTHER WARRANTY OR REPRESENTATION, AND HEREBY DISCLAIMS ANY AND IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE PURCHASER ACKNOWLEDGES THAT THEY ALONE HAVE DETERMINED THAT THE PRODUCT WILL SUITABLY MEET THE REQUIREMENTS OF THE PURCHASER'S INTENDED USE.

### Purchaser's Remedy

STEPCRAFT's sole obligation and purchaser's sole and exclusive remedy shall be that STEPCRAFT will, at its option, either (i) service, or (ii) replace, any product determined by STEPCRAFT to be defective. STEPCRAFT reserves the right to inspect any and all product(s) involved in a warranty claim.

SERVICE OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE PURCHASER'S SOLE AND EXCLUSIVE REMEDY.

### Limitation of Liability

STEPCRAFT SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY, REGARDLESS OF WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, TORT, NEGLIGENCE, STRICT LIABILITY OR ANY OTHER THEORY OF LIABILITY, EVEN IF STEPCRAFT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. Further, in no event shall the liability of STEPCRAFT exceed the individual price of the product on which liability is asserted. As STEPCRAFT has no control over use, setup, final assembly, modification or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability. If you as the purchaser is advised to return the product immediately in new and unused condition to the place of purchase.

### Law

These terms are governed by German law (without regard to conflict of law principals).

This warranty gives you specific legal right, and you may also have other rights. STEPCRAFT reserves the right to change or modify this warranty at any time without notice.

### Warranty Services

#### Questions, Assistance, and Service

Your local STEPCRAFT store and/or place of purchase cannot provide warranty support or service. Once assembly, setup or use of the products has been started, you must contact your local distributor or STEPCRAFT directly. This will enable STEPCRAFT to better answer your question and services you in the event that you may need any assistance. For questions or assistance, please visit our website or call to speak to a product support representative (see item 10.1).

**Inspection or Services**

If this Product needs to be inspected or serviced and is compliant in the country you live and use the product in, please use the STEPCRAFT online service request submission process found on our website or call STEPCRAFT. Pack the product securely using a shipping carton. Please note that original boxes may be included, but are no designed to withstand the rigors of shipping without additional protection. Ship via a carrier that provides tracking and insurance for lost or damaged parcels, as STEPCRAFT is not responsible for merchandise unit it arrives and is accepted at our facility. When calling STEPCRAFT, you will be asked to provide your complete name, street address, email address and phone number where you can be reached during business hours. When sending product into STEPCRAFT, please include your contact details and a list of the included items, and a brief summary of the problem. A copy of your original sales receipt must be included for warranty consideration. Be sure your name and address are clearly written on the outside of the shipping carton.

**Warranty Requirements**

For Warranty consideration, you must include your original sales receipt verifying the proof-of-purchase date. Provide warranty conditions have been met, your product will be serviced or replaced free of charge. Service or replacement decisions are at the sole discretion of STEPCRAFT.

**NON-Warranty Service**


Should your service not be covered by warranty, service will be completed and payment will be required without notification or estimate of the expense unless the expense exceeds 50% of the retail purchase cost. Provided warranty conditions have been met, your product will be serviced or replaced free of charge. Service or replacement decisions are at the sole discretion of STEPCRAFT.

**Non-Warranty Service**

Should your service not be covered by warranty, service will be completed and payment will be required without notification or estimate of the expense unless the expense exceeds 50% of the retail purchase cost. By submitting the item for service you are agreeing to payment of the service without notification. Service estimates are available upon request. You must include this request with your items submitted for service. Non-warranty service estimates will be billed a minimum of ½ hour of labor. In addition you will be billed for return freight. STEPCRAFT accepts money orders cashier’s checks, as well as credit cards and PayPal payment. By submitting any item to STEPCRAFT for service, you are agreeing to STEPCRAFT’s Terms and Conditions found on our website (see item 10.1).

ATTENTION: STEPCRAFT service is limited to product compliant in the country of use and ownership. If received, a non-compliant product will not be serviced. Further, the sender will be responsible for arranging return shipment of the un-serviced Product, through a carrier of the sender’s choice and at the sender’s expense. STEPCRAFT will hold non-compliant product for a period of 60 days from notification, after which it will be discarded.

**10.6 INSTRUCTIONS FOR DISPOSAL OF WEEE BY USERS OF THE EUROPEAN UNION**

	<p>This product must not be disposed of with other waste. Instead, it’s the user’s responsibility to dispose of their waste equipment by handing it over to a designated collections point for he recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensures that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local office, your house-hold waste disposal or where you purchased your product.</p>
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**10.7 RoHS, 2002/95/EG**

We confirm that the machines of the STEPCRAFT series comply with the RoHS, 2002/95/EC

## 10.8 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  
Kalkofen 6  
58638 Iserlohn  
Germany

Type of product: Desktop 3D-System

Type designation: Stepcraft 300 / 300 CK / 420 / 420 CK / 600 / 600 CK

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.

This EC manufacturer's declaration of conformity was issued

in: Iserlohn  
on: 07-31-2013

by:

Peter Urban  
(Managing director)



Markus Wedel  
(Managing director)

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