

# Software & Firmware Upgrades

## Software Components

Inside the HT500 there are two main systems responsible for driving the high- and low-level logics of the system - as seen in the [Electronics Chamber](#) description.

The basic (low-level) functionality of the printing process is managed by the RUMBA board (an Arduino compatible microcontroller board). The firmware running on the microcontroller is a customized version of **Repetier Firmware** - generally referred to as the **Microcontroller Firmware** for the HT500.

The RUMBA board is receiving a feed of commands from the BeagleBone Black embedded computer, which is driving the user interface on the touchscreen as well as the network connectivity and managing print jobs, calibration tasks and all those „high-level“ responsibilities. The Linux Operating System for the BeagleBone Black is loaded directly from a Micro-SD card and is based on Ubuntu 13.10. Included here is an installation of our **RepRapOnRails** Software for all of its machine-specific tasks. The RepRapOnRails application is called the **Software** running on the HT500.

## Upgrade Procedure

For a convenient upgrade process we supply SD card images with the latest versions of all software components readily installed. In short, upgrading your 3D printer boils down to simply creating a new Micro-SD card from one of these image files and replacing the Micro-SD card in the BeagleBone Black with the new one. During the first boot of the system, a new Microcontroller Firmware will also be flashed onto the RUMBA board automatically and the HT500 will basically be ready to use again.

### INFO



*You can also purchase preinstalled up-to-date Micro-SD cards from Kühling&Kühling - just [contact us](#) via email and provide the serial number of your machine.*

Depending on your hardware revision, there may be some additional steps required in preparation for the upgrade. Please select the corresponding step-by-step guide for your machine below.

## Available SD Card Images

This list contains all SD card image files releases and provides information on the software and firmware versions they contain. Make sure you select an upgrade that matches the exact hardware revision of your HT500 (see nameplate on back of machine).

Upgrade Release	Hardware Revision	Software version Firmware version	Download
2015-03-23	1.0.0	RepRapOnRails v1.3.1 Repetier-Firmware v0.91-rri1.0.0-03	<a href="#">reprap-industrial_sd-image_hardware-revision-1.0.0_2015-03-23.img.tar.gz</a>
	1.1.0	RepRapOnRails v1.3.1 Repetier-Firmware v0.91-rri1.1.0-04	<a href="#">reprap-industrial_sd-image_hardware-revision-1.1.0_2015-03-23.img.tar.gz</a>
	1.2.0	RepRapOnRails v1.3.1 Repetier-Firmware v0.91-rri1.2.0-01	<a href="#">reprap-industrial_sd-image_hardware-revision-1.2.0_2015-03-23.img.tar.gz</a>
2015-02-06	1.0.0	RepRapOnRails v1.1.7 Repetier-Firmware v0.91-rri1.0.0-03	<a href="#">reprap-industrial_sd-image_hardware-revision-1.0.0_2015-02-06.img.tar.gz</a>
	1.1.0	RepRapOnRails v1.1.7 Repetier-Firmware v0.91-rri1.1.0-04	<a href="#">reprap-industrial_sd-image_hardware-revision-1.1.0_2015-02-06.img.tar.gz</a>

## Preparing a new Micro-SD card

For the installation of any upgrade a new Micro-SD card (minimum class 10; at least 16 GB capacity) is required.

1. Choose and download the [latest SD card image file](#) for your exact hardware revision
2. Extract the *.img* file from compressed *.tar.gz* archive

*Tipp:*

On *Windows* you can use 7-zip from <http://www.7-zip.org> (extract twice until you are left with a *.img* file!)

On *Linux* use your preferred graphical archive manager or `tar xzvf [file]` from the command line

3. Create a new Micro-SD card from the *.img* image file:

*Windows:* use [win32diskimager](#)

*Linux (all distributions):* using 'dd' from the command line (see [dd manpage](#))

*Ubuntu Linux:* use [gnome-disk-utility](#)

## Upgrade Instructions for Hardware Revision 1.0.0

1. First, [prepare a new Micro-SD card](#).
2. [Insert the SD card](#) into the BeagleBone Black inside the electronics enclosure.

3. If not running, power-up your HT500.
4. Verify all software components are running in the new versions as expected in the [\[Setup\]](#) tab from the touchscreen menu.
5. Configure your Filament and Preheating Profiles in the [\[Configuration\]](#) tab in the touchscreen menu.
6. Go to the [HT500 Slic3r Profile Bundle Repository](#) and download the latest profile bundle **that is compatible with your hardware revision and the new firmware version** (see compatibility notes for each profile bundle release).
7. If necessary upgrade your [Slic3r](#) installation to the version stated in the compatibility notes for the profile bundle you just downloaded.
8. Start Slic3r and remove/backup all existing presets (print/filament/printer).

#### NOTICE

*Using incompatible (e.g. too old) Slic3r profiles may result in machine damage. Double check to match all compatibility relations!*

9. Install the new Slic3r Profile Bundle as described in the README file within your downloaded profile bundle archive.
10. [Change your System shell password](#) via SSH.

#### NOTICE

*In delivery condition the linux operating system on each HT500 has its own, unique shell login password set for the user „kiosk“. If you prepared a new SD card on your own, the system user „kiosk“ (under which RepRapOnRails is executed) is accessible via default login credentials („kiosk“/„kiosk“). It is strongly recommended to change this password as your 3D printer is a network connected device and may otherwise be open to unauthorized shell access from within your computer network.*

The upgrade process is now complete. To prepare your 3D printer for operation, the following calibration tasks are recommended:

- [Backlash calibration](#)
- Extruder Offset calibration (from the [\[Setup\]](#) tab on the touchscreen menu)

## Upgrade Instructions for Hardware Revision 1.1.0

Before starting the upgrade, open the web-interface of your HT500, select the [\[Setup\]](#) tab and write down the following values from the EEPROM editor:

- X backlash [mm]
- Y backlash [mm]

- Extr.2 X-offset [steps]
- Extr.2 Y-offset [steps]

Then start the upgrade process:

1. First, [prepare a new Micro-SD card](#)
2. [Insert the SD card](#) into the BeagleBone Black inside the electronics enclosure
3. If not running, power-up your HT500
4. Verify all software components are running in the new versions as expected in the [\[Setup\]](#) tab from the touchscreen menu
5. Configure your Filament and Preheating Profiles in the [\[Configuration\]](#) tab in the touchscreen menu
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The upgrade process is now complete. To prepare your 3D printer for operation, open the web-interface again on the [\[Setup\]](#) tab and enter the values you have written down earlier into their corresponding fields:

- X backlash [mm]
- Y backlash [mm]
- Extr.2 X-offset [steps]

- Extr.2 Y-offset [steps]

In case one or both of the backlash values are 0 (zero), it is recommended to [calibrate the axis' backlash](#) to significantly improve print quality.