

# Troubleshooting

## Where to find ...

**Print quality and the printing process:** find descriptions on general troubles with the extrusion of filament, aborting of print jobs, unsatisfying quality of printed and the like.

**Mechanical issues:** provides an overview on issues arising from or leading to mechanical faults such as dry shafts or wrong axes positions.

**Electrical problems and communication/network errors:** look up what to do if the connection between the 3D printer and the PC cannot be established, the boot process fails or the .log-file provides false time entries.

**Slicing settings or CAD data:** a list of topics not directly based on faults of the 3D printer but generally influencing the print result negatively or making operation uncomfortable.

**Error messages:** a detailed description of error messages appearing in the .log-file.

## Defects / Issues

### Printing process / print quality

| <b>No.</b> | <b>Symptom</b> | <b>Possible cause(s)</b> | <b>To do</b> | <b>Additional information</b> |
|------------|----------------|--------------------------|--------------|-------------------------------|
|------------|----------------|--------------------------|--------------|-------------------------------|


| No. | Symptom   | Possible cause(s)   | To do  | Additional information  |
|-----|---|---|--|---|
| P1  | Print job finishing correctly but extrusion stops midway.   | Increased friction in the feed system by:<br>- bent filament strand<br>- bent or constricted supply hose<br>- false insertion of filament strand in the inlet<br>- wryly coiled filament spool<br>- jammed dust wiping sponge   | ✓ Make sure that:<br>- the filament is coiled spirally and free of kinks;<br>- the supply hoses are not constricted, free of kinks and laid out in adequate radii;<br>- the filament is inserted in the inlet at an angle of 90°   | <a href="#">Operating manual</a>  |
|     |   | False idler lever preload.  | ✓ Measure and correct the idler lever tension.   | <a href="#">Service manual</a><br><a href="#">Knowledgebase</a>   |
|     |   | Flexible (e.g. textile fibers) or solid particles (e.g. soot) clogging the nozzle tip.  | ✓ Disassemble and clean the extruding components.  | <a href="#">Disassembly</a><br><a href="#">Cleaning</a>   |
|     |   | Print bed leveled too close.<br>Nozzle tip clogs due to internal pressure.  | ✓ Run the [Print Bed Leveling] wizard.   | <a href="#">Tips &amp; Tricks</a><br><a href="#">Operating manual</a>   |
|     | Drive gear grinding the filament.   | Filament diameter exceeds tolerances.   | ✓ Measure the filament diameter and roundness at at least 5 points with a distance of 0.5 m. Measure minimal two times at the same position at an angle of 90°. The diameter must lie between<br>2.75 - 2.95 mm<br>(2.85±0.1 mm)<br><br>✓ Also check that the filament is free of kinks and bulges.<br><br>If the diameter exceeds the stated value or there are other irregularities, there is a manufacturing fault in the filament. Contact your filament supplier for service. | <a href="#">Tips &amp; Tricks</a><br><br>If you ordered the filament directly from Kühling&Kühling, contact our technical support for replacement.<br><a href="#">Technical support</a> |
|     | Print speed too high for the currently installed material.  | The standard settings for the HT500 have been extensively tested with our snow-white ABS. Other materials show different melting behavior and friction. Try the following when printing new materials:<br>✓ Decrease the print speed.<br>✓ Increase the extrusion temperature.<br>✓ Always use very latest Slic3r profiles from our GitHub repository as starting point for individual profile customization. |  | <a href="#">Knowledgebase</a><br><a href="#">Slic3r manual</a><br><a href="#">GitHub</a>  |
|     | Extrusion temperature is too low due to deviation of value measured at the hot end heater and real temperature at the nozzle tip.                               | ✓ Check the quality of the extruded filament and increase the extrusion temperature 5 - 10 °C if required.  |  | <a href="#">Knowledgebase</a>   |
|     | Target temperature is not reached due to lack of heat transfer between heating block and melter.  | ✓ Remove the heating block, thoroughly clean the bore of plastic residues if necessary (only sheer metal must remain) and re-install. Fasten the set screw tightly.   |  | <a href="#">Service manual</a>  |
|     | Increased friction in the hot-end barrel due to:  |   |  |   |
|     | - clogging or blocking  |   | ✓ Deinstall the barrel and check for material residues.<br>Clean the barrel thoroughly if required.  | <a href="#">Service manual</a><br><a href="#">Cleaning recommendation</a><br><a href="#">Knowledgebase</a>  |
|     | - deformation, scratched inner surface  |   | ✓ Deinstall the barrel and check for bends and excessive scratching of the inner surface. If such is present, replace the hot-end.   | <a href="#">Service manual</a><br><a href="#">order spare parts</a>   |
|     | False gap fill settings (Slic3r) effect over-extrusion and layer-wise adding up of material which leads to clogging of the nozzle due to internal overpressure. |   | ✓ Set "gap fill speed" to 0<br>→ Slic3r → Print Settings → Speed / Speed settings for print moves  | <a href="#">Slic3r manual</a>   |

| No. | Symptom   | Possible cause(s)   | To do  | Additional information   |
|-----|---|---|--|--|
| P2  | Warping of the print object during or after the print.  | Poor <b>first layer adhesion</b>  |  | <a href="#">Knowledgebase</a>  |
|     |   | Print bed leveled too far away.   | ✓ Run the [Print Bed Leveling] wizard.   | <a href="#">Tips &amp; Tricks</a><br><a href="#">Operating manual</a>                                |
|     | Extruded strands do not merge, are deformed and/or laid on the print bed instead of being pressed.          | Print bed temperature is too low.   | ✓ Check temperature in the <i>Manual Control</i> menu; if necessary, increase print bed temperature in the Slic3r software (Filament settings).  | <a href="#">Slic3r manual</a>  |
|     |   | Wrong Slic3r settings   | ✓ Adjust the Slic3r settings for the first layer.  | <a href="#">Tips&amp;Tricks</a>  |
|     | Strands are separated by print head movement.   | Separating agents (e.g. fingerprints) on the print bed  | ✓ Clean the print bed with acetone.  | <a href="#">Service manual</a>   |
|     |   | <b>Z-positioning</b> inaccurate due to:   |  |  |
|     |   | Stick-and-slip effects when shafts are very dry (see <a href="#">M1</a> also).  | ✓ Lubricate with <i>Ballistol Universal</i><br>NOTICE<br><i>Only valid for HT500 3D printers up to hardware revision 1.1.0.</i>  | <a href="#">Service manual</a>   |
|     |   | Settling processes of the spindle adjusting ring (e.g. during transport).   | ✓ Reposition the adjusting ring and refasten the set screw.  | <a href="#">Service manual</a>   |
| P3  | Layer separation  | (see <a href="#">P6</a> also)<br>Extrusion temperature is too low.  | ✓ Check the extrusion temperatures via the <i>Expert Control</i> menu; if necessary, correct in the Slic3r software (Filament settings).   | <a href="#">Knowledgebase</a><br><a href="#">Slic3r manual</a>                                       |
| P4  | Printed circular structures (holes, cylinders) are deformed and out of round.                               | Backlash in the X- and/or Y-axis.   | ✓ Calibrate backlash.  | <a href="#">Service manual</a>   |
|     |   |   | ✓ Check timing belt tension.   | <a href="#">Service manual</a>   |
|     |   |   | ✓ Check for loosened X-axis and/or Y-axis drive pulley. Refasten the set screws with a #1.5 Allen key.<br>NOTICE<br><i>Only valid for HT500 3D printers up to hardware revision 1.1.0.</i> | <a href="#">Technical support</a>  |
| P5  | Print starts off-center   | Wrong print bed center or origin settings in Slic3r.  | ✓ Check for correct settings according to your Slic3r-hardware combination.  | <a href="#">Service manual</a>   |
| P6  | Gaps between extruded strands.  | Under-extrusion; extrusion multiplier too low.  | ✓ Run the [Extrusion Calibration] wizard; save the calculated multiplier in the Slic3r filament profile.   | <a href="#">Operating manual</a><br><a href="#">Tips&amp;Tricks</a><br><a href="#">Slic3r manual</a> |
|     | Loose, open-stranded top/bottom layers.   |   |  |  |
| P7  | Filament bends and twists between drive gear and hot-end inlet, the filament is not conveyed to the nozzle. | Flexible materials (e.g. TPEs): the gap between drive gear and hot-end inlet is too wide for printing without modification. | ✓ Download, print and install the required adapter   | <a href="#">GitHub</a><br><a href="#">Knowledgebase</a>  |
|     |   | Build chamber temperature is too high for temperature-sensitive materials.  | ✓ Check the Vicat softening temperature of the material and reduce the build chamber temperature to a value 5 - 10 °C below.   | <a href="#">Tips&amp;Tricks</a>  |

| No. | Symptom  | Possible cause(s)   | To do   | Additional information   |
|-----|--|---|---|--|
| P8  | Print job cannot be finished although every mechanical or electronic issue has been checked. Strange artifacts appear in printed object.<br>Print fails for no obvious reason and with varying effects (clogging of the nozzle, grinding of the drive gear, insufficient layer binding etc.) | STL-file corrupted  | ✓ Check the STL-file for holes, intersections, misaligned edges and the like. Repair or redesign if necessary.  | <a href="#">Tips&amp;Tricks</a><br><a href="#">Slic3r manual</a><br><a href="#">netfabb manual</a> |
| P9  | Extrusion temperature drops mid-print and extruder drive stops. All axes keep moving.  | Broken thermistor at the heating block of the extruder. see <a href="#">EM1</a> also  | ✓ Check cable connections of the thermistors for damage or wear. If the fragile cables of the thermistor are broken, the heating unit must be replaced. | <a href="#">Service manual</a><br><a href="#">order spare parts</a>                                |
| P10 | Visible drop formation (blobs) on external perimeters.   | High-resolution models result in G-code-resolution finer than the printer can render; increased memory usage leads to buffer data loss and pause times. | ✓ Increase the <i>minimum detail resolution</i> of the Slic3r software.   | <a href="#">Service manual</a><br><a href="#">Slic3r manual</a>                                    |
|     |  | Downsizing (scaling) of high-resolution models in Slic3r increases the resolution further; 3D printer cannot translate resolution adequately            | ✓ Downscale the model before exporting it as .stl and adding it to Slic3r.  |  |

## Mechanical

| No. | Symptom                                     | Possible cause(s)   | To do   | Additional information         |
|-----|---|---|---|--------------------------------|
| M1  | Juddering of the print table during homing. | Very dry shafts lead to increased stick-and-slip effects.         | ✓ Lubricate the Z-shafts with <i>Ballistol Universal</i><br>NOTICE<br><i>Only valid for HT500 3D printers up to hardware revision 1.1.0.</i>        | <a href="#">Service manual</a> |
| M2  | Increasingly rough vertical surfaces        | Very dry shafts may lead to increased vibrations of the extruder. | ✓ Lubricate the X- and Y-shafts with <i>Ballistol Universal</i><br>NOTICE<br><i>Only valid for HT500 3D printers up to hardware revision 1.1.0.</i> | <a href="#">Service manual</a> |

| No. | Symptom  | Possible cause(s)   | To do   | Additional information  |
|-----|--|---|---|---|
| M3  | Homing the X-axis leads to extruder head collision and blackout of the controls.   | X-axis limit stop bent by crash due to misinterpreted home-position.  | <ul style="list-style-type: none"> <li>✓ Disconnect the printer from the power supply and carefully bend back limit stop with tweezers.</li> </ul> <p><b>NOTICE</b><br/>Always power down the 3D printer before touching electronic components with conductive tools to avoid damages by short-circuiting.</p>  |   |
|     |  | G-code home positions of X-axis incorrect.  | <ul style="list-style-type: none"> <li>✓ Check Slic3r for correct axes settings (depending on the release versions of the 3D printer version and the slic3r software).</li> </ul>   | <a href="#">Service manual</a>  |
| M4  | Although the left extruder has been selected as reference during leveling, the print head moves the right extruder into the center position. | Extruder offset in the web interface has been set incorrect or for the false extruder (e.g. after an update).   | <ul style="list-style-type: none"> <li>✓ Check in the <i>Setup</i> tab of the web-interface for the following:<br/>Extr.1 X-offset [steps] set to 0<br/>Extr.1 Y-offset [steps] set to 0<br/>Extr.2 X-offset [steps] set to 2078<br/>Extr.2 Y-offset [steps] set to -21</li> </ul> <p>Regard that these are factory presets. Run the [Extruder Offset Calibration] wizard to adjust these for your specific 3D printer.</p> | <a href="#">Upgrade information</a>   |
| M5  | Filament uncoils from the spool (especially when using new 2.3 kg spools).   | The spool rim is too narrow for the amount of material on new spools. The material's elasticity is due to the manufacturing process and will cause the filament to uncoil when not under tension. | <ul style="list-style-type: none"> <li>✓ Print three to four of the <i>filament spool wings</i> provided at the GitHub repository and fasten them to the outside of the spool's rim. If required, apply a small amount of hot glue.</li> </ul>  | <a href="#">GitHub</a><br> |
| M6  | Noticeable amount of gas bubbles in the cooling system.  | Lack of coolant due to leakage.   | <ul style="list-style-type: none"> <li>✓ Refill coolant.</li> </ul>   | <a href="#">Service manual</a>  |

## Electronic, network, communication

| No. | Symptom   | Possible cause(s)  | To do   | Additional information         |
|-----|---|--|---|--------------------------------|
| E1  | Status indicator on the touchscreen displays "Offline" (after booting). | USB-to-Serial chip (RUMBA board) is in DFU mode (firmware programming mode); firmware is lost or corrupted | <ul style="list-style-type: none"> <li>✓ More information and remedy see ⇒</li> </ul> | <a href="#">Service manual</a> |

| No. | Symptom  | Possible cause(s)   | To do  | Additional information                  |
|-----|--|---|--|---|
| E2  | <p>Upon boot, the touchscreen stays black for more than 5 minutes and will not display anything.</p> <p>Inside the electronics chamber, the block of three LEDs on the BeagleBone Black is solid blue (no flashing).</p> | <p>The operating system for the BeagleBone Black embedded computer could not be loaded from its SD card.</p>  | <p>✓ Switch off the power supply main switch, switch on again.</p> <p>If the system is successfully booting now, the problem was only temporary and is resolved.</p>                       |   |
|     |  |   | <p>In case the behavior recurs frequently, the Micro-SD card may be malfunctioning.</p> <p>✓ Try building a new Micro-SD card as detailed in the Software &amp; Firmware upgrade guide</p> | <p>Software &amp; Firmware Upgrades</p> |
| E3  | <p>Timestamps of log-file entries are incorrect and/or inconsistent.</p> <p>Timestamps of log entries are reset at re-start.</p>   | <p>Printer is connected to a local network that does not provide internet access (no gateway available).</p> <p>LAN network is firewall protected.</p>  | <p>✓ Check your network's firewall and internet settings → free internet access must be provided for NTP synchronisation through port 123/UDP</p>  |   |
|     |  | <p>The 3D printer cannot keep accurate time by itself, it needs to occasionally synchronize with a public NTP time signal server (e.g. during boot)</p> | <p>✓ re-configure the printer to fetch a time signal from an in-house NTP-server if available</p>  | <p>Tips&amp;Tricks</p>                  |
| E4  | <p>The web-interface is not contactable via the network.</p>   | <p>Network cable disconnected.</p>  | <p>✓ Check that the network cable at the rear cover of the electronic chamber is in place.</p>   | <p>Manual</p>                           |
|     |  | <p>URL spelling mistakes</p>  | <p>✓ Check for correct spelling of the URL.</p>  | <p>Operating manual</p>                 |
|     |  | <p>Network does not provide DHCP.</p>   |  |   |
|     |  | <p>Printer and PC are not connected to the same network.</p>  | <p>✓ Ask your system administrator for help.</p>   |   |

| No. | Symptom  | Possible cause(s)  | To do   | Additional information  |
|-----|--|--|---|---|
| E5  | The web-interface displays "Offline" while the 3D printer's touchscreen status indicator reads "Idle". The communication fails.  | 3D printer web-socket connection unavailable.<br>Possible reasons (excerpt):<br>- proxy-server or firewall settings<br>- outdated internet browser versions<br>- locked network ports etc. | <ul style="list-style-type: none"> <li>✓ Try using another PC and/or another internet browser.</li> <li>✓ Confer with your system administrator regarding: <ul style="list-style-type: none"> <li>- unblocked protocols/ports</li> <li>- use of static or dynamic IP-address</li> <li>- firewall and/or network restrictions</li> <li>- network proxy-server configuration</li> </ul> </li> </ul> |   |
| E6  | After starting the 3D printer, the touchscreen stays completely black, the background lighting is <b>off</b> . The light ring of the wake button is illuminated. Communication via the web interface functions normally. | Defective HDMI port of the BeagleBone black.   | <ul style="list-style-type: none"> <li>✓ The BeagleBone black must be replaced.</li> </ul>  | Contact the <a href="#">sales team</a> for a quote on the spare part or an in-house repair. |
| E7  | The HMI does not react to user input.  | Undervoltage of the USB port of the BeagleBone Black due to defective cable harness.   | <ul style="list-style-type: none"> <li>✓ Exchange of the cable harness.</li> </ul>  | Contact the <a href="#">sales team</a> for ordering the spare part.                         |

## Slicing, CAD-files

| No. | Symptom   | Possible cause(s)  | To do  | Additional information                 |
|-----|---|--|--|--|
| S1  | Profile names are not readable in Slic3r drop-down menus. | Incompatibility of Slic3r (v1.1.7) and Windows operating software. | <ul style="list-style-type: none"> <li>✓ Rename profiles with shorter description.</li> <li>✓ Upgrade to higher version of Slic3r.</li> </ul>                    | <a href="#">Tips&amp;Tricks Slic3r</a> |
| S2  | Crashing of Slic3r with STL-file.                         | STL-file corrupted see <a href="#">P8</a> also                     | <ul style="list-style-type: none"> <li>✓ Check the STL-file for holes, intersections, misaligned edges and the like. Repair or redesign if necessary.</li> </ul> | <a href="#">Tips&amp;Tricks</a>        |

## Error messages

The *Log* tab of the touchscreen and of the web interface contain the communication and operation commands of the HT500 since the day of initial commissioning, including ERROR messages about false statuses (e.g. overheating, connectivity).

The following list provides all possible ERROR messages that may be found in the log file together with an explanation on the possible causes and, if required, available remedying procedures.

An ERROR message does not necessarily mean that the 3D printer has a malfunction. Such messages can also represent a status messages generated before another required process has been finished



and fed back.

Use the below list if an ERROR message appears in your log file and you are unsure about its meaning and effects.

| No. | Message   | Possible cause(s)/ effects   | To do  | Further information   |
|-----|---|--|--|---|
| EM1 | <p>Printer set into dry run mode until restart!<br/>           followed by internal test<br/>           (example):<br/> <i>extruder 0: temp sensor defect</i><br/> <i>extruder 1: working</i><br/> <i>extruder 2: working</i><br/> <i>heated bed: working</i></p> | <p>The named thermistor measured a limit value derivation. The measured temperature exceeded/came below the allowable limit value.</p> <p>All heating elements are switched off. Extrusion may stop mid-print.</p> | <p>✓ Check cable connections of the thermistors for damage or wear.<br/>           If the fragile cables of the thermistor are broken, the heating unit must be replaced.<br/>           see <a href="#">P9</a> also</p> | <p>Limit values are:<br/>           0 ... 300 °C<br/> <a href="#">Service manual</a></p> <p>Request a quote for the fully assembled replacement part via <a href="mailto:sales@kuehlingkuehling.de">sales@kuehlingkuehling.de</a></p> |