



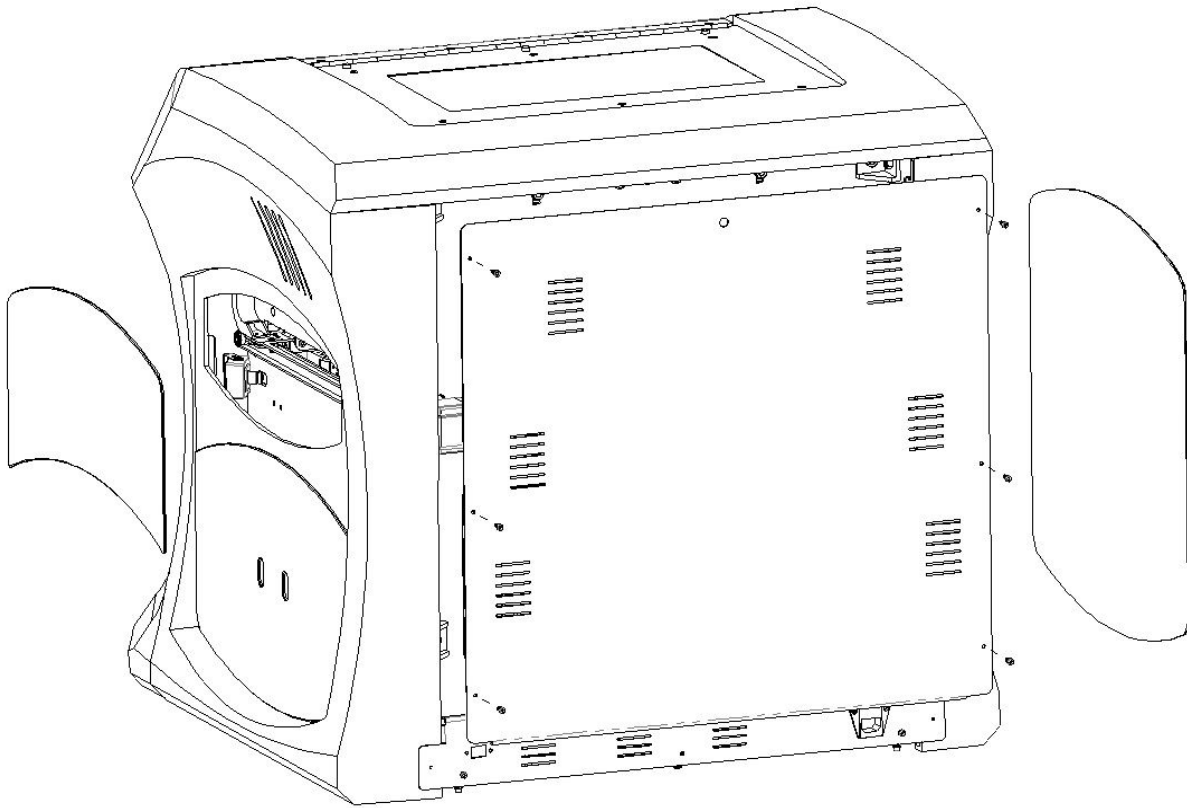
Title	Spindle Replacement
Models	Bolt and Bolt Pro
Version	1.4
Revision date	30-07-2018
Expected duration	30 minutes

Description
<p>This guide explains how to replace a Z spindle. The Z spindles support the bed support plate on which the print bed is mounted. The movement of the three Z spindles is controlled with a belt system that is connected to a motor. When the motor rotates all spindles will rotate in the same direction and speed causing the bed to move up or down. If replacing multiple spindles done one at a time.</p> <p>Remember to use protective gloves, glasses and clothing for each of these activities.</p>

Guideline
<p>If changing multiple spindles do so one at a time, this is necessary to maintain alignment. Any calibration should be done only after completing the final replacement.</p> <p>Manual will focus on right spindle. The process for removing spindles is identical for all spindles however the back spindle has the additional step of removing the second pulley. This is explained in further detail where necessary.</p>

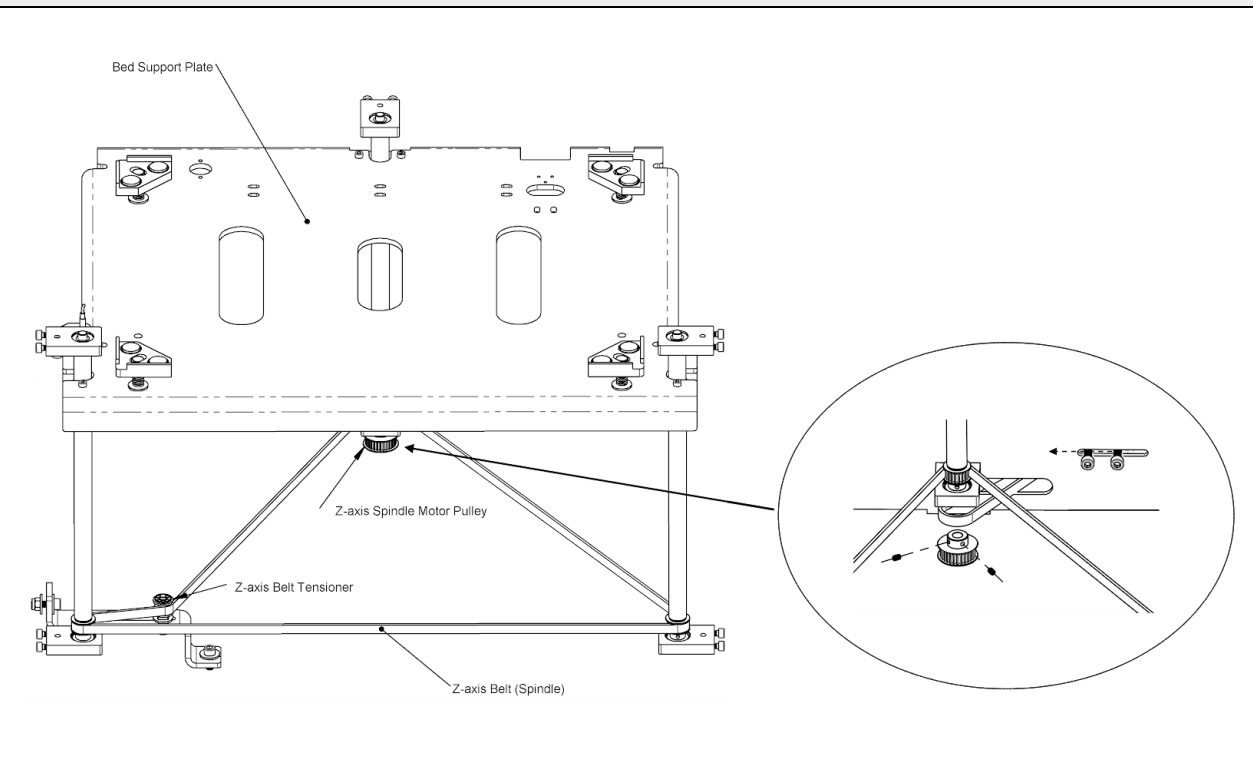
Tools
Allen wrench 2, 3, 4, 5
Wrench 8, 10

Step 1 Removing covers



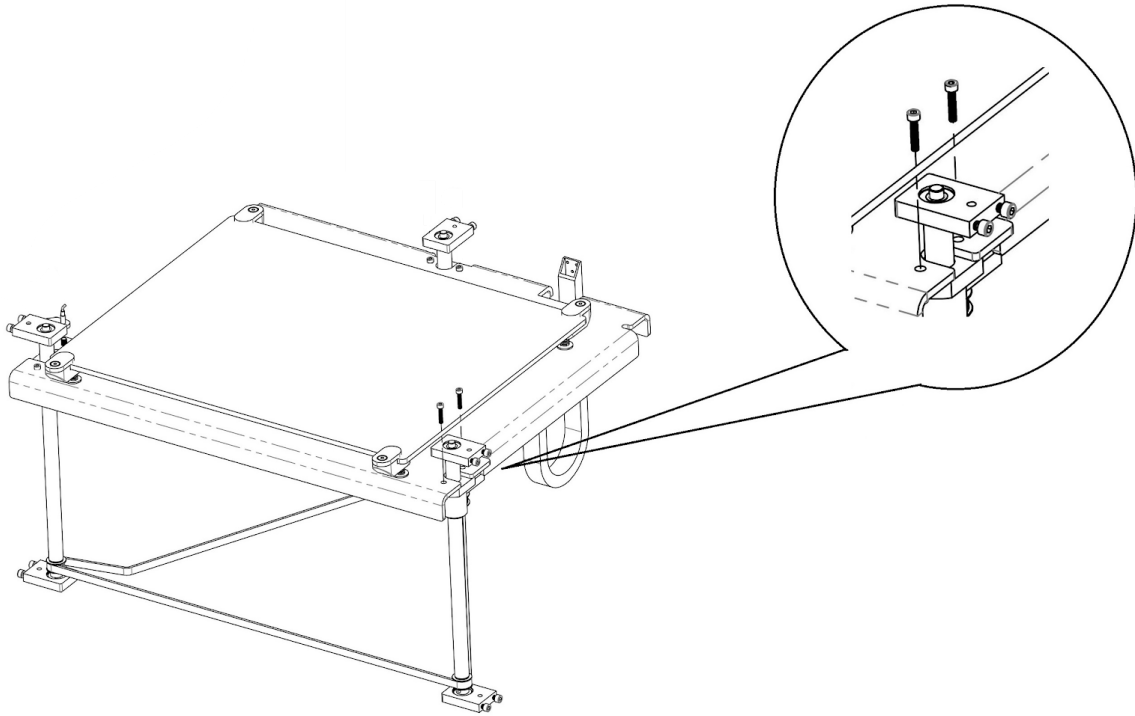
a.	Before starting this procedure. Make sure your machine is switched off and the Hot End has cooled.
b.	Remove all 6 bolts on the back cover using Allen Key size 5.
c.	Remove the left and the upper right side cover by pulling.

Step 2 Release tension on the belt



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| a. | Loosen the Z-axis Belt Tensioner using wrench size 10. Once loosened, slide it to the left. The Z-axis Belt (Spindle) Should now be untensioned. |
| b. | Only when replacing the back spindle: Loosen the two bolts using allen wrench 5 just enough to be able to slide them to the left side to release tension on the Z-axis Belt (Motor) |
| c. | Only when replacing the back spindle: Loosen the two set screws using allen wrench 2 to remove the Z-axis Spindle Motor Pulley. Removal can be done by sliding the Z-axis Spindle Motor Pulley downwards. |

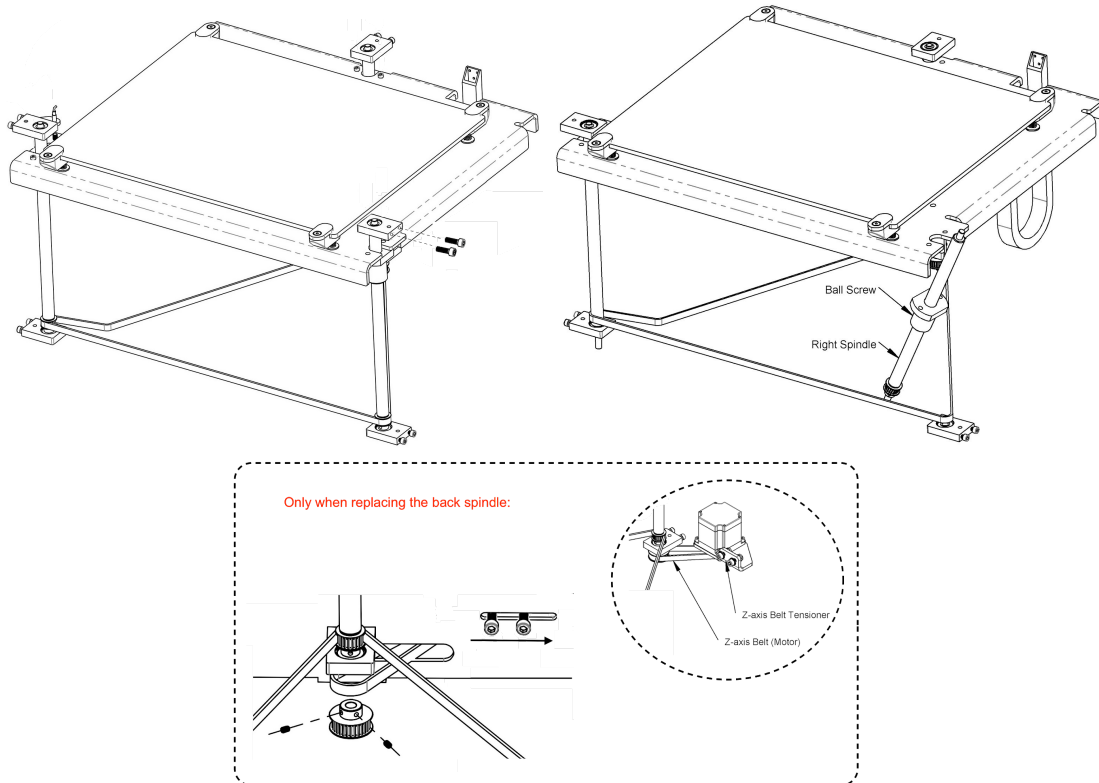
Step 3 Disconnect the bed support plate from the Spindle Ball Screw



Only one spindle can be replaced at a time. The detailed view is only applicable to the right spindle

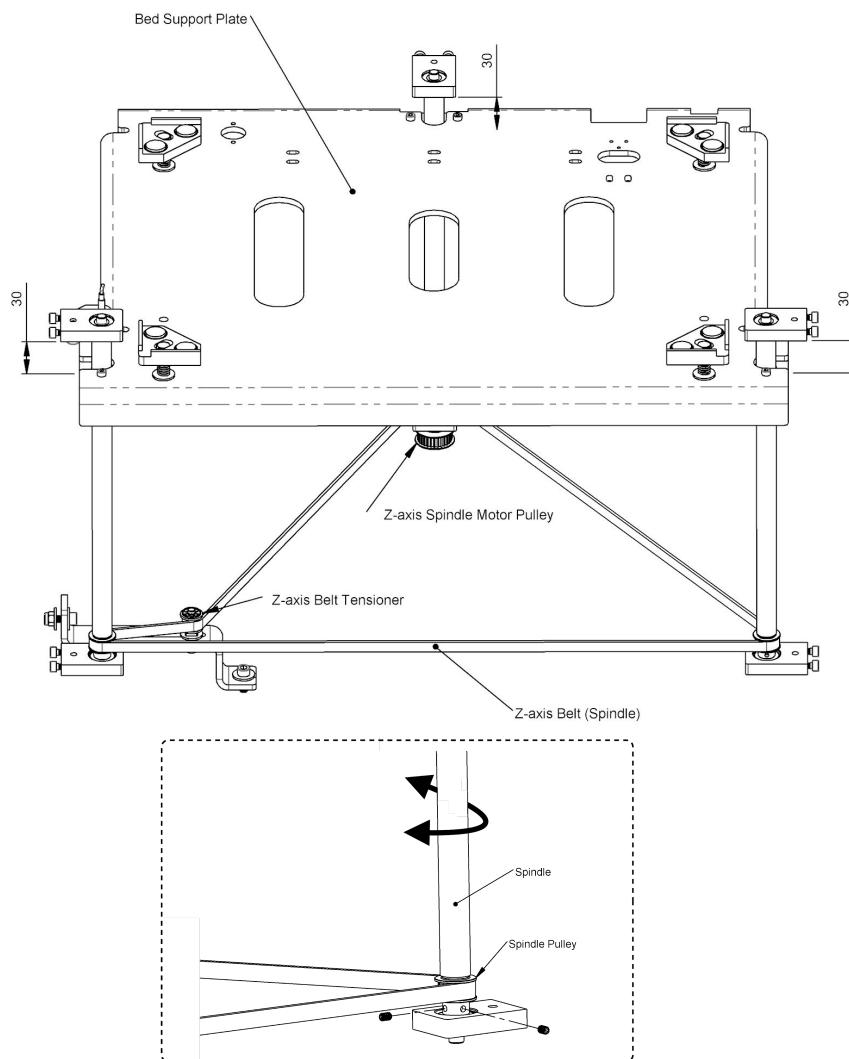
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| a. | For the spindle that needs replacing, remove the two bolts and nuts, using allen wrench 4 and wrench 8, that mount the Bed Support Plate. Please do not disconnect the remaining two spindles. |
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Step 4 Disconnecting the Spindle



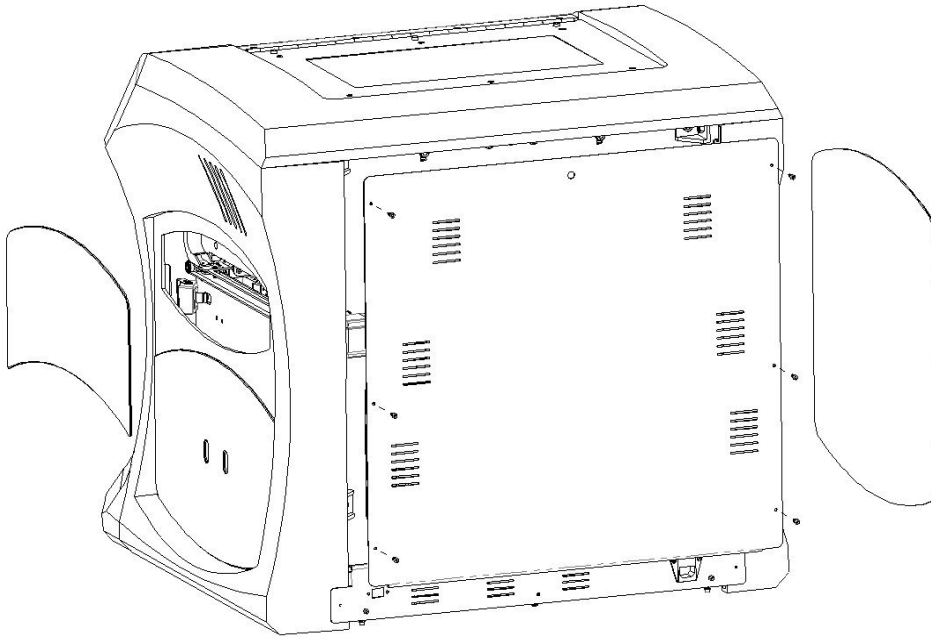
a.	Remove the top two bolts to loosen bearing block for the spindle.
b.	Remove the bearing block from the current spindle and attach it to the replacement spindle.
c.	To remove the desired spindle simply pull the spindle upwards in a vertical movement. The Ball Screw may be rotated to a more convenient position in order to manoeuvre the spindle out.
d.	Place the replacement spindle and make sure the belt surrounds it.
e.	Tighten the top two bolts of each spindle to secure them into position.
f.	Only when replacing the back spindle: Slide the Z-axis Spindle Motor Pulley on the Back Spindle by moving it upwards. Align it horizontally with the Z-axis Motor Pulley and then tighten the two set screws using allen wrench 2.
g.	Only when replacing the back spindle: Install the Z-axis Belt (Motor) back on to the Z-axis Spindle Motor Pulley and Z-axis Motor Pulley. Tension the Z-axis Belt (Motor) by slide the two bolts holding the Z-axis Motor in a rightwards direction. When the correct tension has been established tighten both bolts using wrench 5
Belts should be tight enough to minimize slack, but not so tight that they start placing a lot of stress on the motor shaft or pulleys.	

Step 5 Aligning the Bed Support Plate



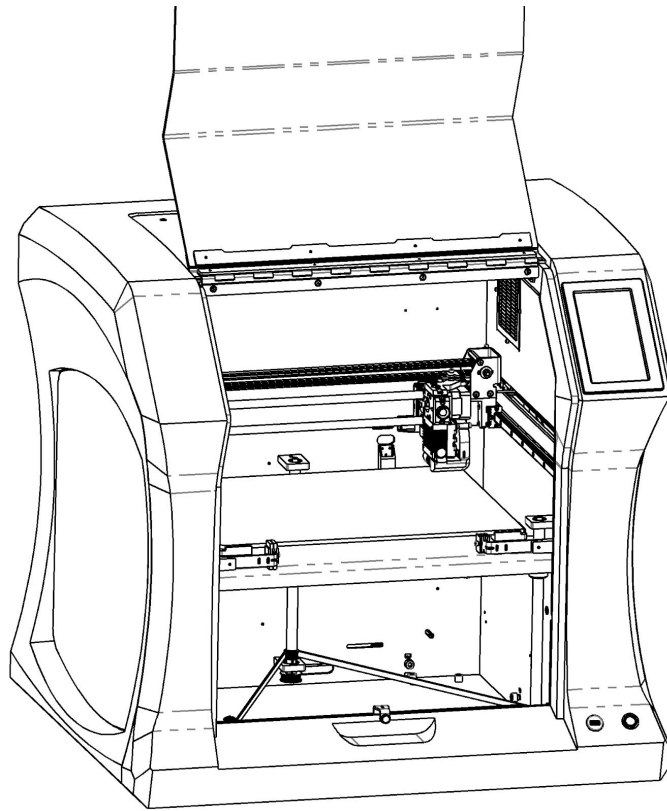
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| a. | Because the Z-axis Belt (Spindle) is not yet installed, each spindle can rotate individually. Please rotate all spindles until the bed support plate equals a 30mm spacing between all three bearing blocks. |
| b. | Tension the Z-axis Belt (Spindle) by sliding the Z-axis Belt Tensioner in a rightwards direction. Please try to keep the spacing achieved at step a. intact as much as possible. |
| c. | At this point, the spacing between bearings blocks and support plate should be 30mm \pm 1mm. If this tolerance is exceeded by one of the spindles, loosen the Spindle Pulley using allen wrench 2, rotate the spindle individually (hold belt if necessary to stop the other spindles from rotating) until the tolerance is within spec, then tighten both set screws again. |

Step 6 Placing both side covers back



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| b. | Reinstall all 6 bolts on the back cover using Allen Key size 5. |
| c. | Place left and right side covers by pushing the covers into position. |

Step 7 Calibrating



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| a. | Switch on the machine |
| b. | Navigate to the bed calibration feature in the menu and follow the procedure. |