

Rat Rig

03. Linear Rails

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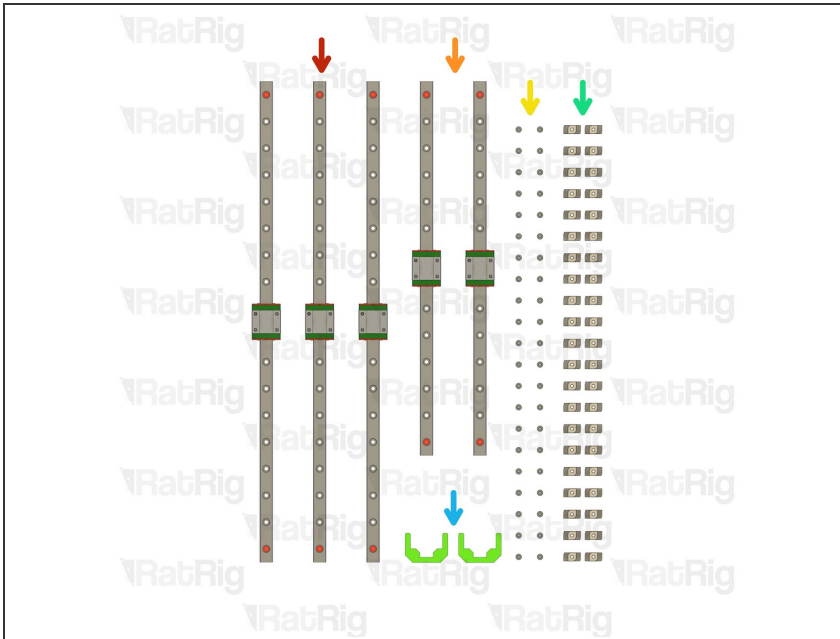
INTRODUCTION

Please note: All measurements and component counts provided in this guide are based upon building a 300x300 V-Core 3.

If you are building a machine of a different size, please refer to the following list for the linear rail lengths, and required number of fasteners:

- **200x200:** 2x 250mm, 3x 300mm, 28x M3x12 Screw, 28x 3030 T-Nuts
- **300x300:** 2x 350mm, 3x 400mm, 38x M3x12 Screw, 38x 3030 T-Nuts
- **400x400:** 2x 450mm, 3x 500mm, 48x M3x12 Screw, 48x 3030 T-Nuts
- **500x500:** 2x 550mm, 3x 600mm, 58x M3x12 Screw, 58x 3030 T-Nuts

Step 1 — Prepare the linear rail parts



- 3x 400mm MGN12 Linear Rail
- ⓘ There will be a fourth rail of this length in the kit. Leave that one in its packaging until later
- 2x 350mm MGN12 Linear Rail
- 38x M3x12 Cap Head Screw
- 38x 3030 Drop-in T-Nut - M3
- 2x MGN12 3030 Alignment Tool (Colour may vary)


⚠ The linear rail carriages are not interchangeable. Do not try to use a carriage on a different linear rail than the one it was supplied with.

Step 2 — Unpack and prepare the linear rails







⚠ The linear rails are supplied with a protective oil coating on them. It is **strongly recommended** to prepare your work surface with paper towels and to wear disposable gloves.

- Paper Towels
- Linear Rail

-  Carefully open one end of the linear rail packaging and remove the rail. Place the rail upon the

paper towels and dispose of the packaging

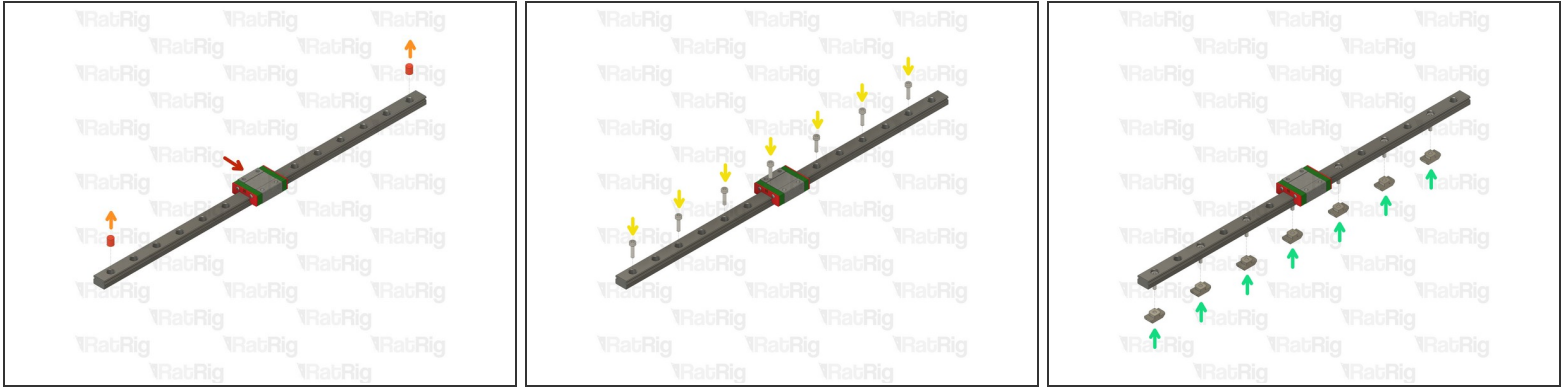
-  The oil on the rails protects them from rusting. You must either replace this oil after cleaning (as directed below), or make sure not to remove all of the original oil during preparation
-  An easy solution to both protect, and lubricate the rails, is using a light oil such as 3-in-1 or sewing machine oil
-  Apply a small amount of oil to a paper towel and then apply the oil to the rail by wiping it with the oiled paper towel. This may be done prior to, or after installation of the linear rails.
-  More advanced users may wish to fully grease the rails & carriage with a specialised bearing lubricant. It is important to use the correct grade and make sure there are no additives such as PTFE, graphite, molybdenum disulfide, etc. The recommended grade of grease is EP00 or EP000 as these lubricate well, without being too viscous.

Step 3 — Inspect & test the linear rails



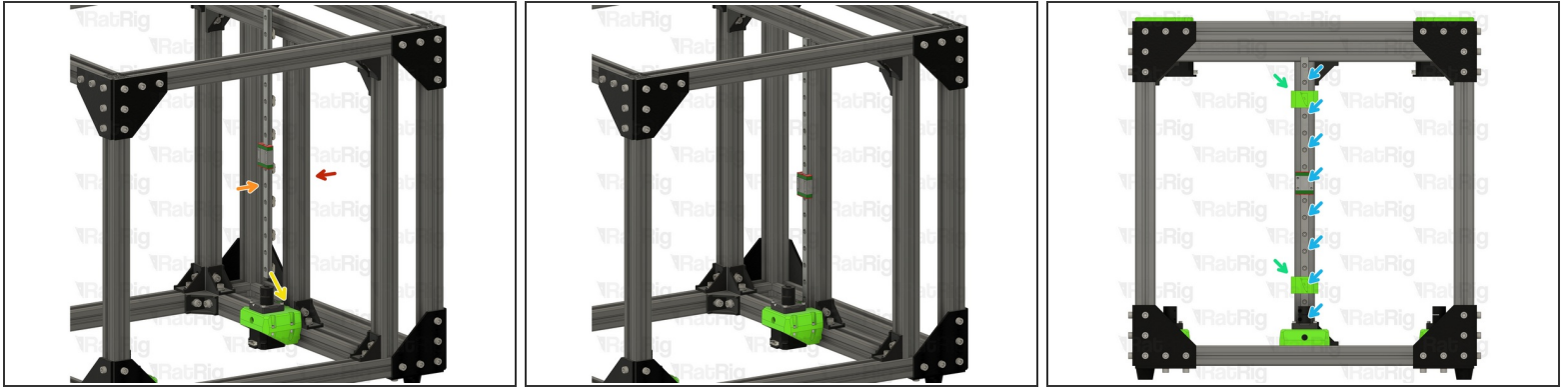
- With the rail still on the absorbent paper towels, carefully and slowly move the carriage from one end of the rail to the other
 - ⓘ The carriage should move smoothly over the entire length of the rail
 - ⚠ Small changes in resistance are normal, but the carriage becoming much harder to push, or binding completely are not
 - Repeat the previous test whilst applying a small amount of force downwards on the carriage
 - ⓘ The carriage will likely travel more smoothly when applying a downwards force, this is normal
- ⚠ If the carriage does not move smoothly, or binds completely, refer to the [Linear Rail Troubleshooting Guide](#)

Step 4 — Prepare the linear rails for installation



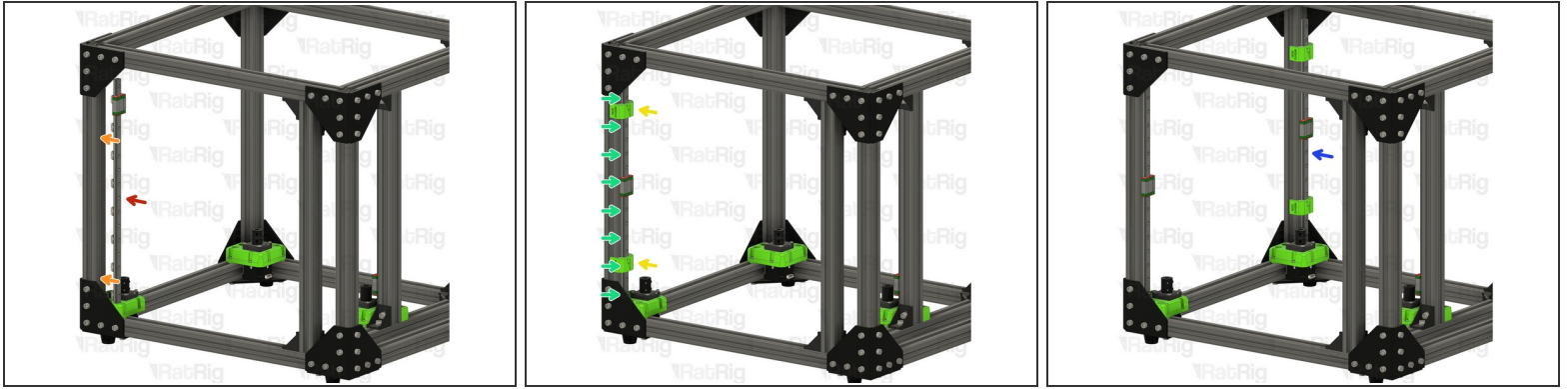
- Linear Rail
- Remove the plastic stops installed in the ends of the linear rail
 - ⚠ Do not allow the linear rail carriage to leave the end of the rail
- Insert an M3x12 screw in every other hole in the linear rail
- Loosely thread a 3030 T-Nut onto each of the M3x12 screws
- Repeat these steps for the other 4 rails

Step 5 — Install the rear z-axis linear rail



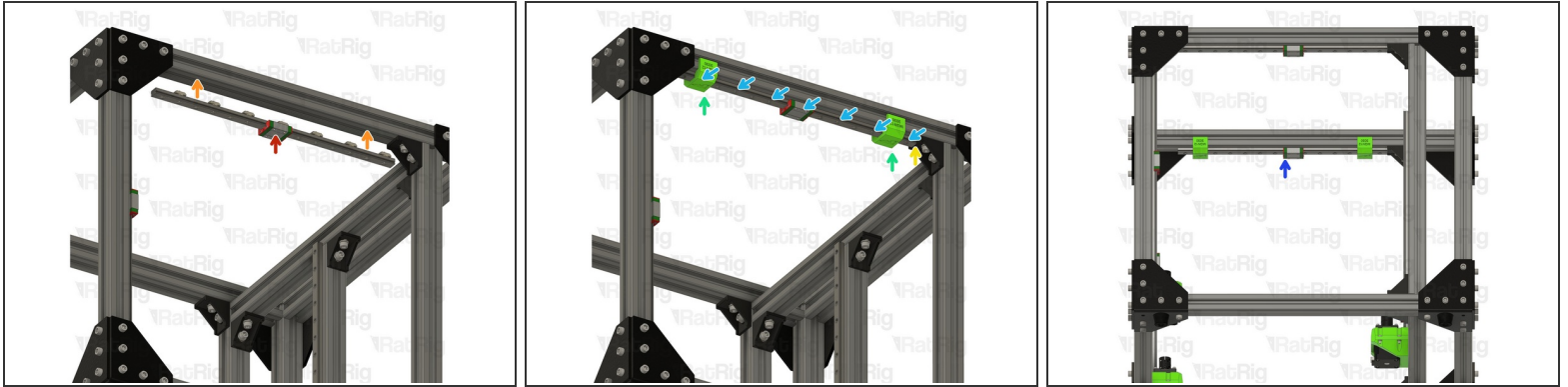
- V-Core 3.1 Frame Assembly
- 400mm MGN12 Linear Rail Assembly
- Insert the linear rail into the 3030 extrusion
 - ⓘ The linear rail will rest on the lead screw motor cage
- Install the two MGN12 3030 alignment tools as shown, this will make sure the linear rail is positioned correctly
- Fasten the marked M3x12 screws, starting from the bottom
- Remove the MGN12 3030 alignment tools

Step 6 — Install the front z-axis linear rails



- 400mm MGN12 Linear Rail Assembly
- Insert the linear rail into the 3030 extrusion
 - ⓘ The linear rail will rest on the front lead screw motor cage
- Install the two MGN12 3030 alignment tools as shown, this will make sure the linear rail is positioned correctly
- Fasten the marked M3x12 screws, starting from the bottom
- Remove the MGN12 3030 alignment tools
- Repeat these steps for the linear rail on the opposite side

Step 7 — Install the y-axis linear rails



i Installation of the Y-axis rails may be easier if you place the V-Core 3 frame upside down

- 350mm MGN12 Linear Rail Assembly
- Insert the linear rail into the 3030 extrusion
- Position the linear rail so that its end touches the 3030 cast corner bracket as shown
- Install the two MGN12 3030 alignment tools as shown, this will make sure the linear rail is positioned correctly
- Fasten the marked M3x12 screws, starting from one end
- Remove the MGN12 3030 alignment tools and repeat these steps for the linear rail on the opposite side

Step 8 — Next guide



- Continue with the next guide: [04. CoreXY Idler Assemblies](#)

