



3DISM

QALAM SERIES · ASSEMBLY & SERVICE MANUAL

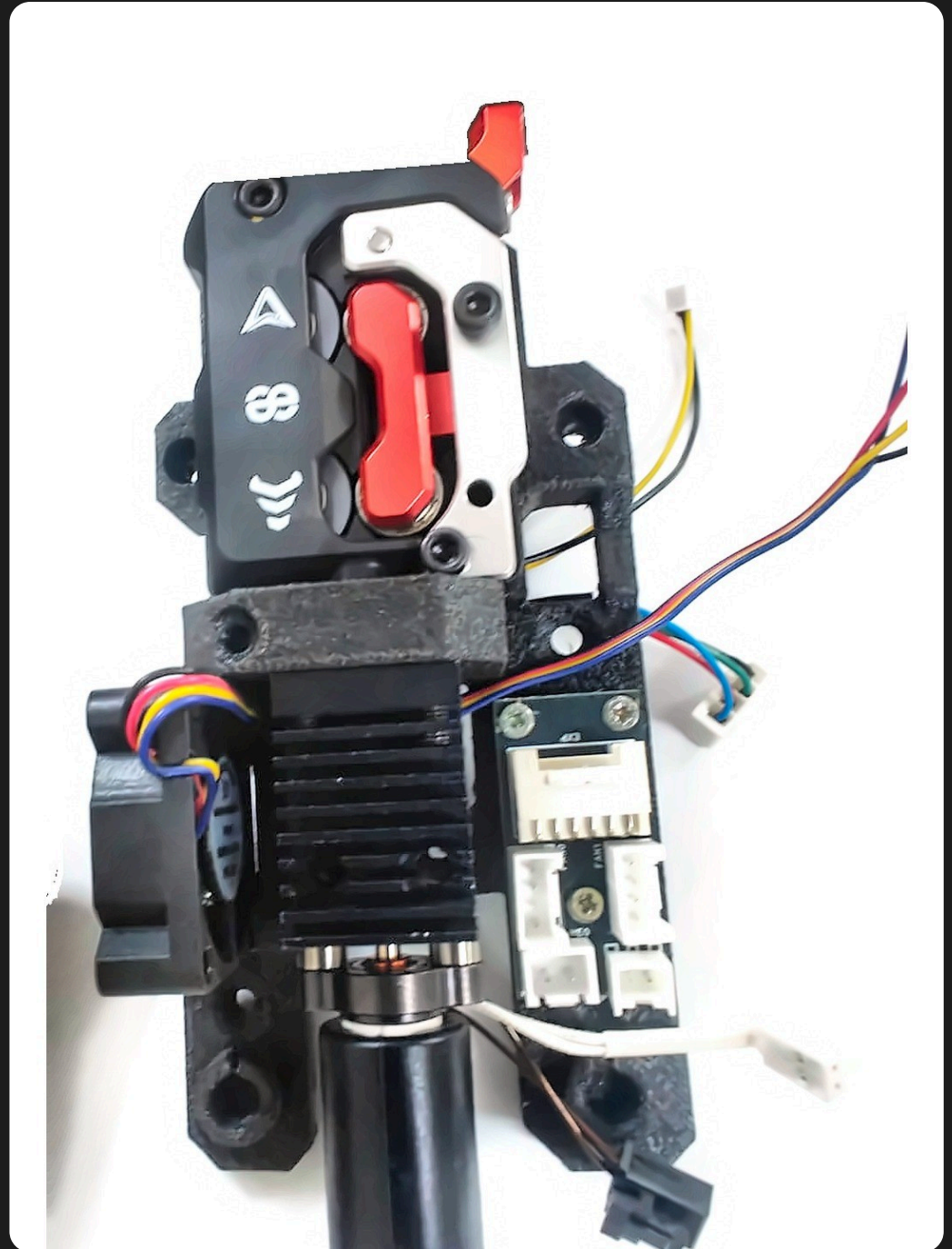
Extruder Assembly

Step-by-step assembly of the QALAM extruder and toolhead: gear stage, runout sensor, motor, extruder, hotend, fan and breakout board.

Steps
22

Parts
14

Edition
October 2026





Before you start

Safety

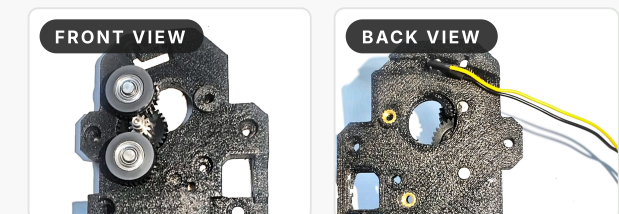
- ⚠ Switch the printer **off** and **unplug** it before working on the toolhead.
- ⚠ Let the hotend cool down completely. The nozzle and heater block stay hot long after the screen goes dark.
- ⚠ Never heat the hotend with the hotend cooling fan disconnected.
- ⚠ Connect or disconnect cables only while the printer is off.
- ⚠ Do not overtighten bolts that go into printed parts. Snug is enough.

Tools you need

- ⬡ Hex keys **2.0 mm** and **2.5 mm** (M3 bolts)
- ⬡ Small **Phillips** screwdriver (breakout board)
- ⬡ Sharp blade or **PTFE tube cutter**
- ⬡ Flat-nose pliers or a small **bench vise** (press-fits)
- ⬡ **Tweezers** (steel ball)
- ⬡ Ruler or caliper

How to read this manual

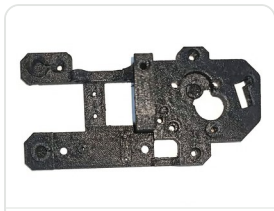
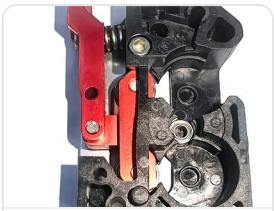
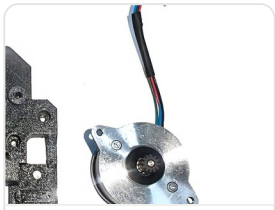
- ⬡ Coloured bullets match the arrows of the **same colour** in the picture.
- Ⓐ Letters are part labels. See the **parts list**.
- ⚠ **Warning.** Read before you continue.
- ✓ **Check.** Test this before moving on.
- ⓘ **Tip.** Makes the job easier.
- ⬡ **Front view** = the gear side of the main body faces you. **Back view** = the motor side.





Parts list

Letters are used in every step

						
A Main body (printed) Qty 1	B M4 dowel pin Qty 2	C Drive gear with bearing, upper Qty 1	D Drive gear with bearing, lower Qty 1	E 6×2 mm bearing Qty 1	F Central drive gear Qty 1	G Extruder front body Qty 1
						
H Filament runout switch Qty 1	I PTFE tube 4×2 mm, 5 mm long Qty 1	J Steel ball, 4 mm Qty 1	K Extruder stepper motor Qty 1	L Hotend Qty 1	M Hotend cooling fan Qty 1	N Toolhead breakout board Qty 1

Fasteners

FASTENER	QTY	USED IN
M4 dowel pin (B)	2	Step 3
M3 bolt: motor	1	Step 12
M3 bolt: extruder front body	3	Step 15 (one removed and refitted in steps 17 and 19)
M3 bolt: hotend clamp	2	Step 19
M3 bolt: hotend fan	2	Step 20
Screw: breakout board		Step 21

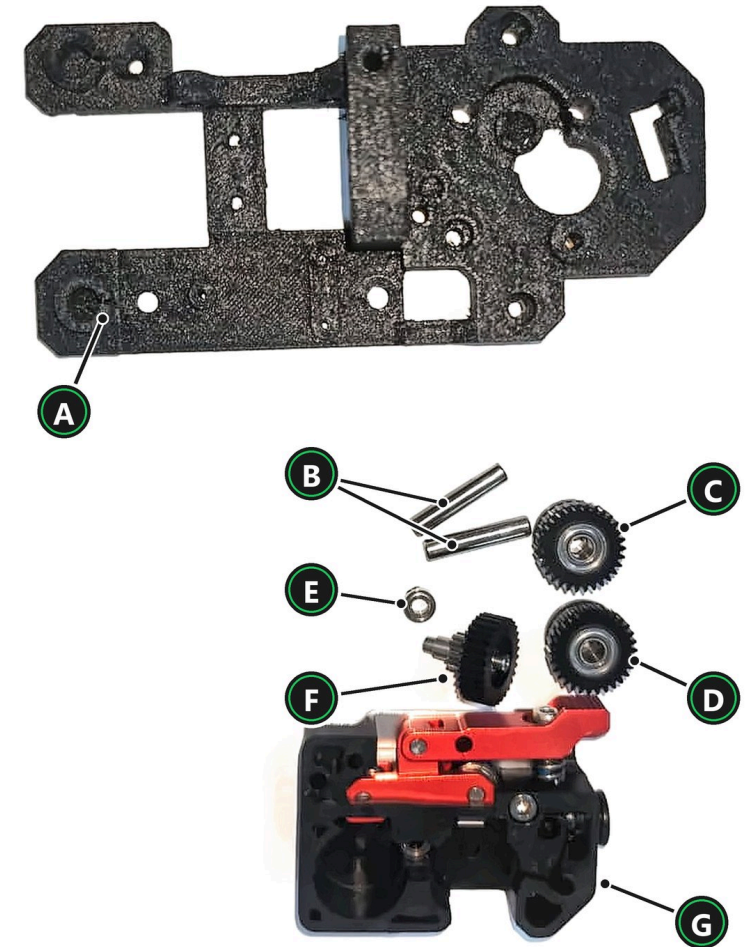


1 Gear stage parts

Step 1 of 22

For the first stage you need these parts:

- A** Main body (printed)
 - B** M4 dowel pins (2×)
 - C** Drive gear with bearing, upper
 - D** Drive gear with bearing, lower
 - E** 6×2 mm bearing
 - F** Central drive gear
 - G** Extruder front body (used from step 8)
- i** Work on a clean, light-coloured surface. Small parts, like the steel ball used later, are easy to lose.

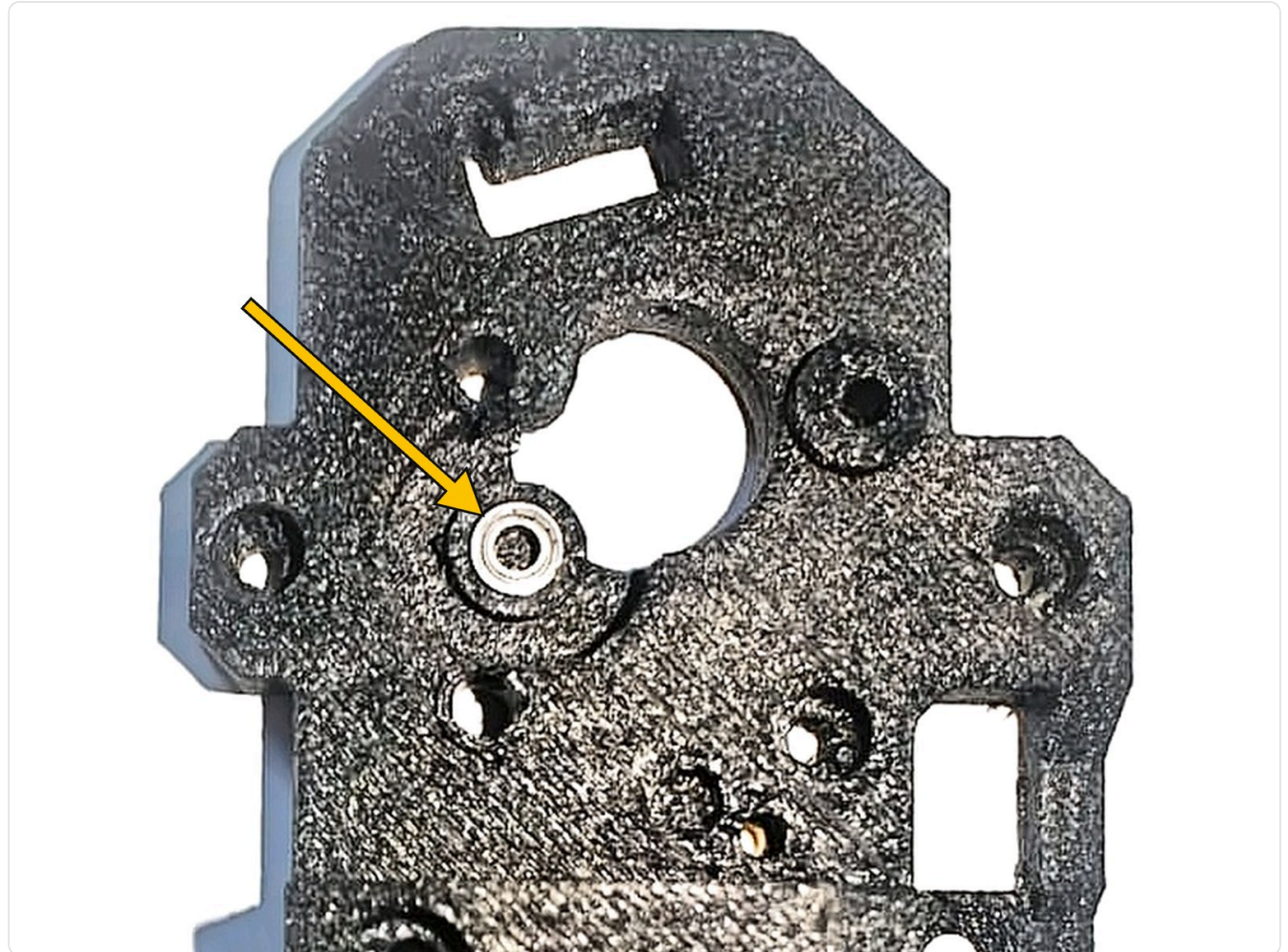




2 Inserting the bearing

Step 2 of 22

- Lay the **main body (A)** flat with the front side up. This is the side the gears go on.
- Press the **6×2 mm bearing (E)** into the round pocket to the left of the large motor hole.
- ✓ The bearing sits fully down and flush with the surface. It must not wobble.
- ⚠ Press on the bearing's outer ring only. Pushing on the inner ring can damage the bearing.

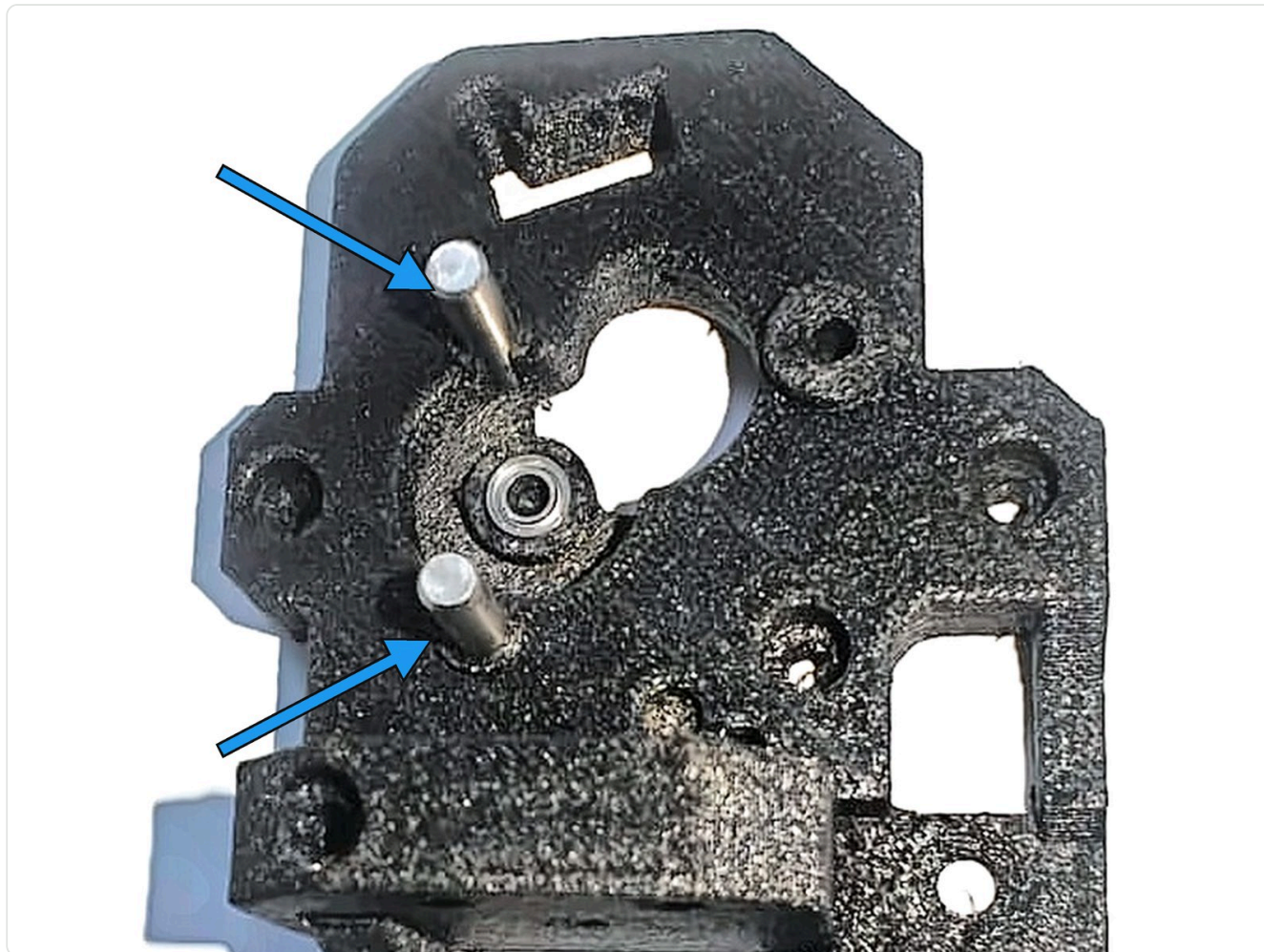




3 Inserting the dowel pins

Step 3 of 22

- ◆ Press the two **M4 dowel pins (B)** into the holes above and below the bearing.
- ✓ Both pins stand straight and are fully seated. The drive gears turn on these pins.
- ❗ If a pin is tight, press it in with a small vise or flat-nose pliers. Do not hammer the printed part.

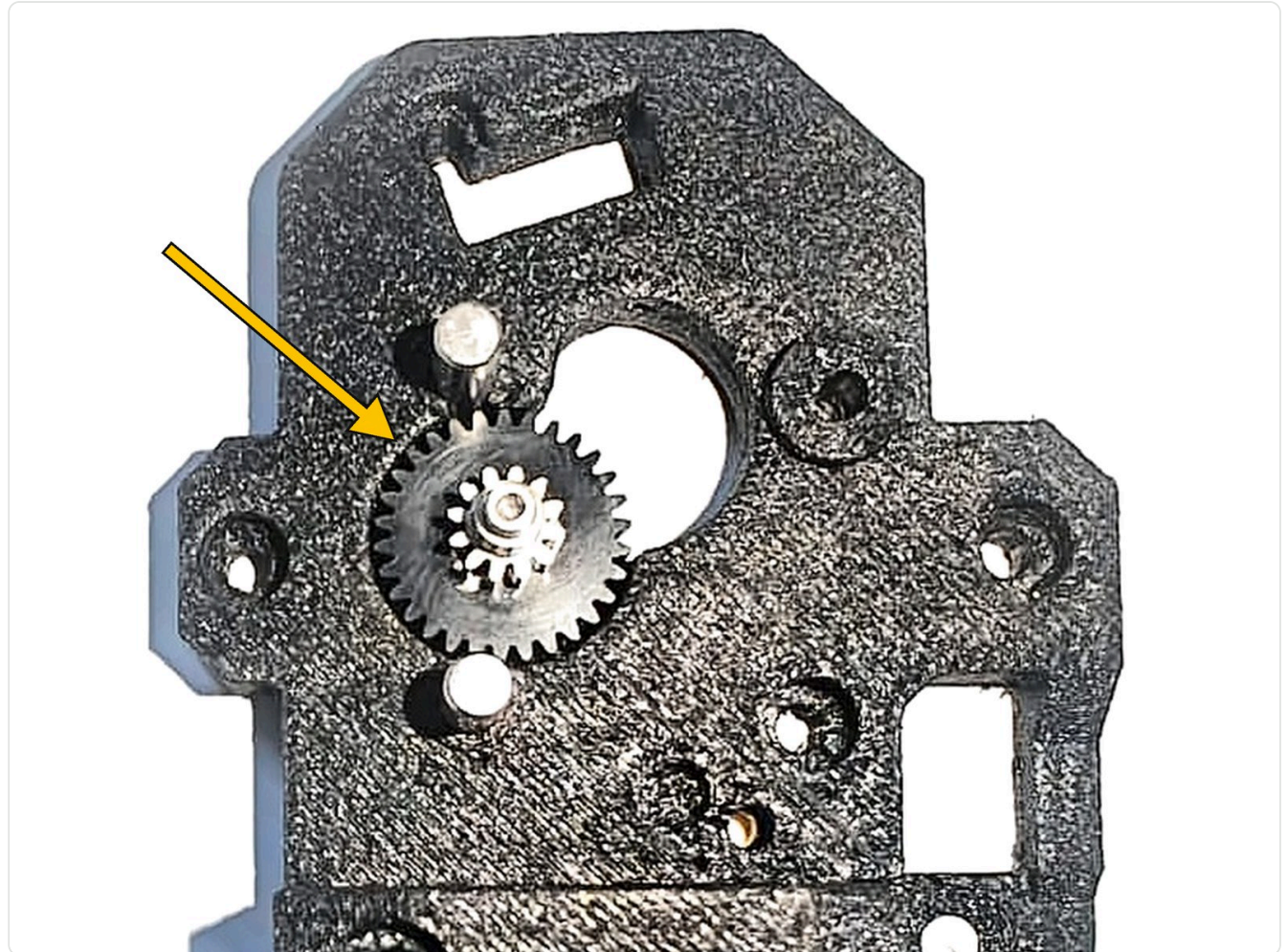




4 Installing the central drive gear

Step 4 of 22

- Fit the **central drive gear (F)**. One end of its shaft goes into the **6×2 mm bearing (E)**.
- Turn the gear with a finger. It spins freely and does not rub on the body.

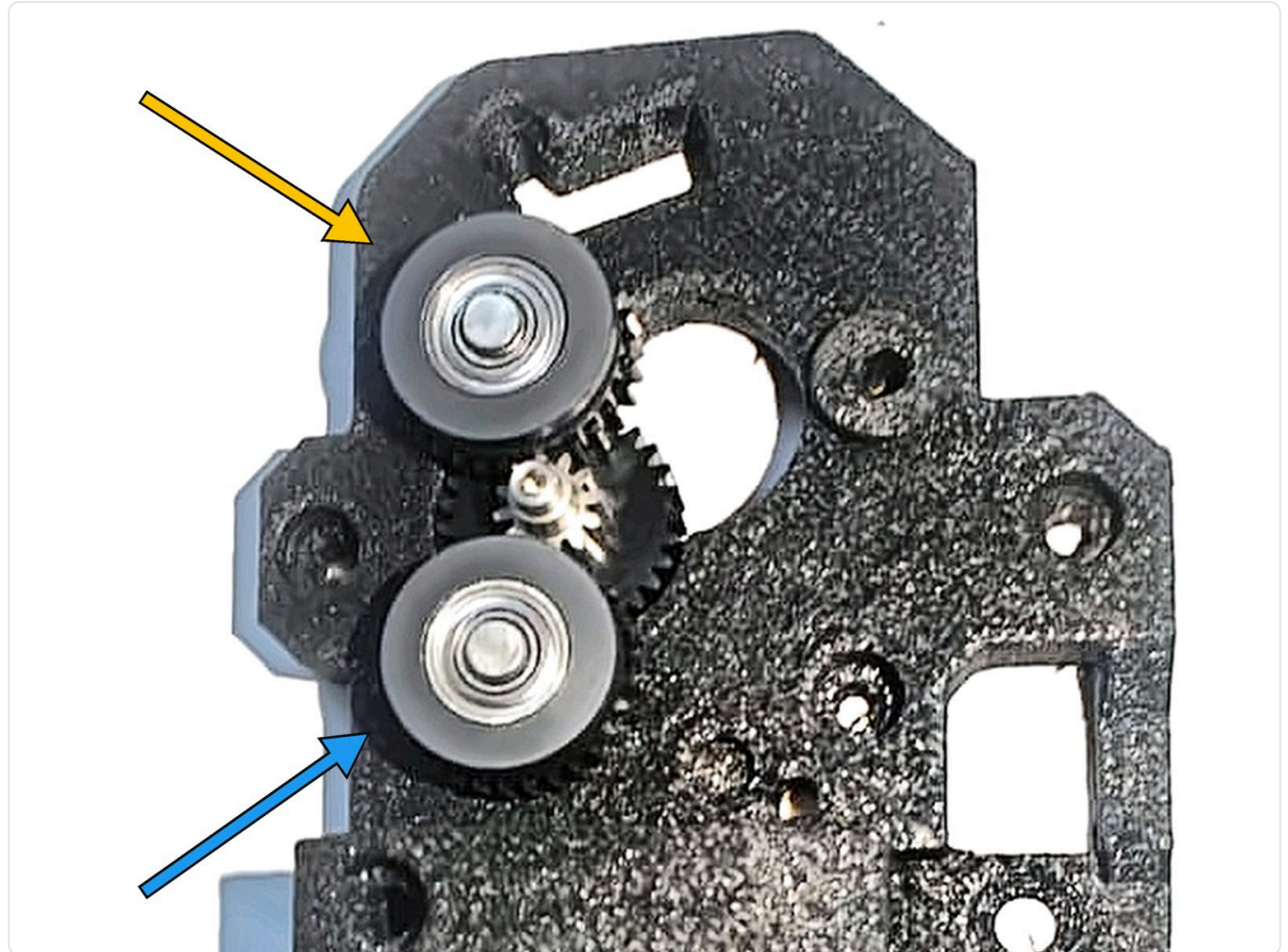




5 Installing the drive gears

Step 5 of 22

- Slide the **upper drive gear (C)** onto the upper dowel pin.
- Slide the **lower drive gear (D)** onto the lower dowel pin.
- The teeth of both drive gears mesh with the **central drive gear (F)**.
- Turn the central gear. Both drive gears turn with it, smoothly and without binding.

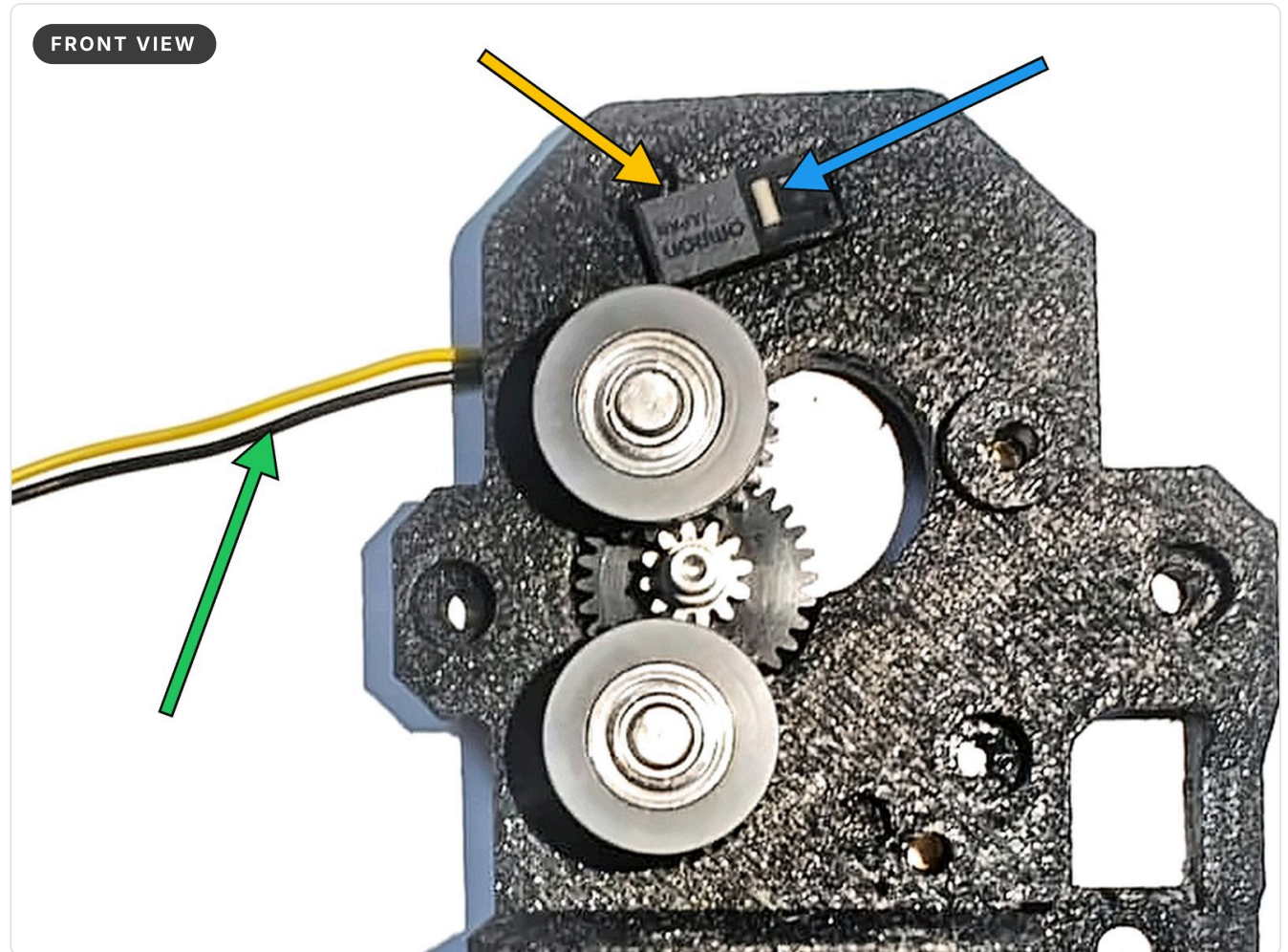




6 Mounting the runout switch

Step 6 of 22

- Insert the **filament runout switch (H)** into the slot at the top of the main body.
- Front view: the switch **trigger** must be on the **right**.
- Front view: the switch **wire** must come out on the **left** side.
- ⚠ If the switch is fitted the other way round, the runout sensor will not work.

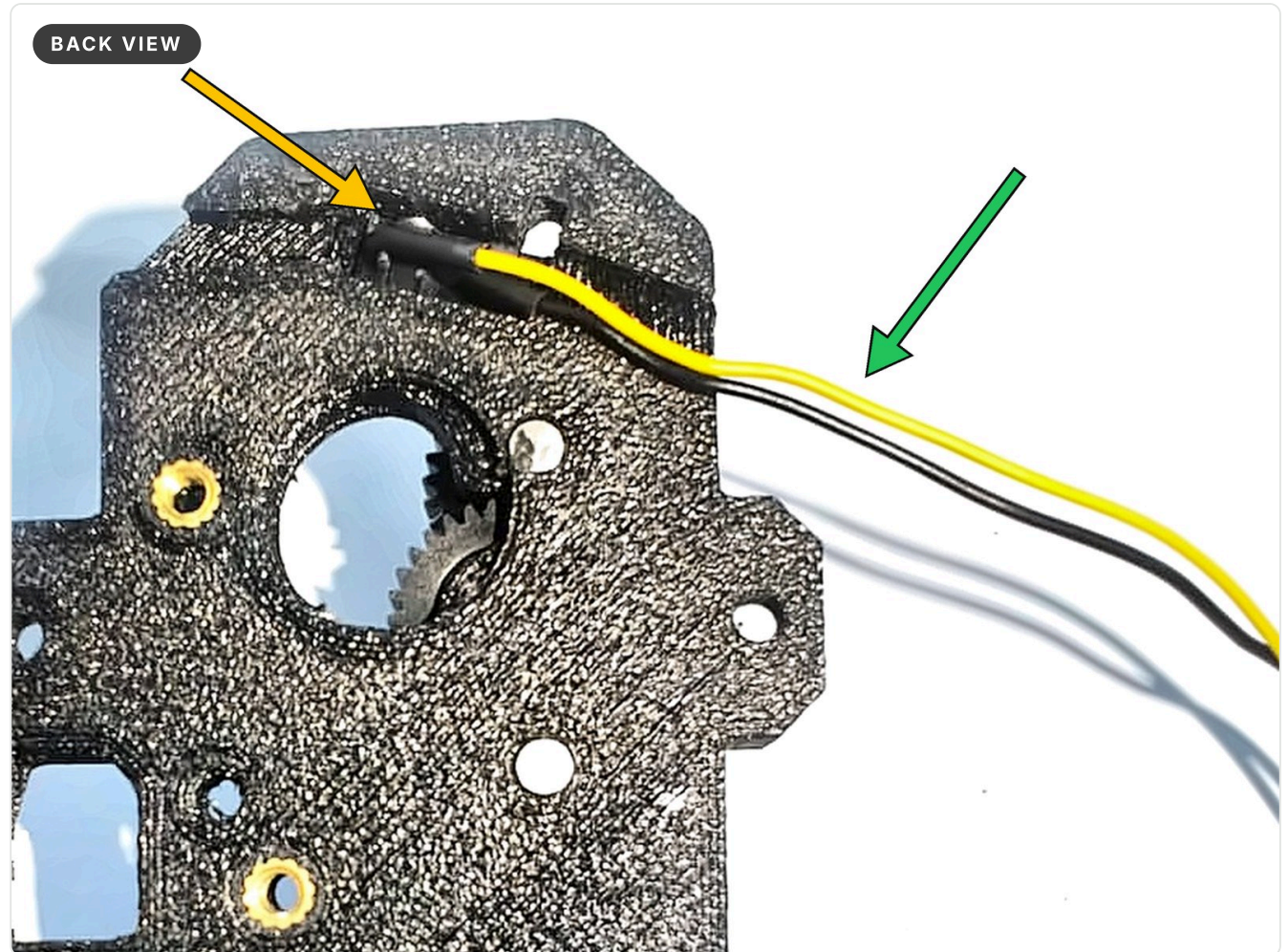




7 Checking the switch wire

Step 7 of 22

- Turn the main body over. This is the back view.
- The **runout switch (H)** sits in its slot at the top.
- From the back, the switch **wire** runs out to the **right**. This is the same side as "left" in the front view.

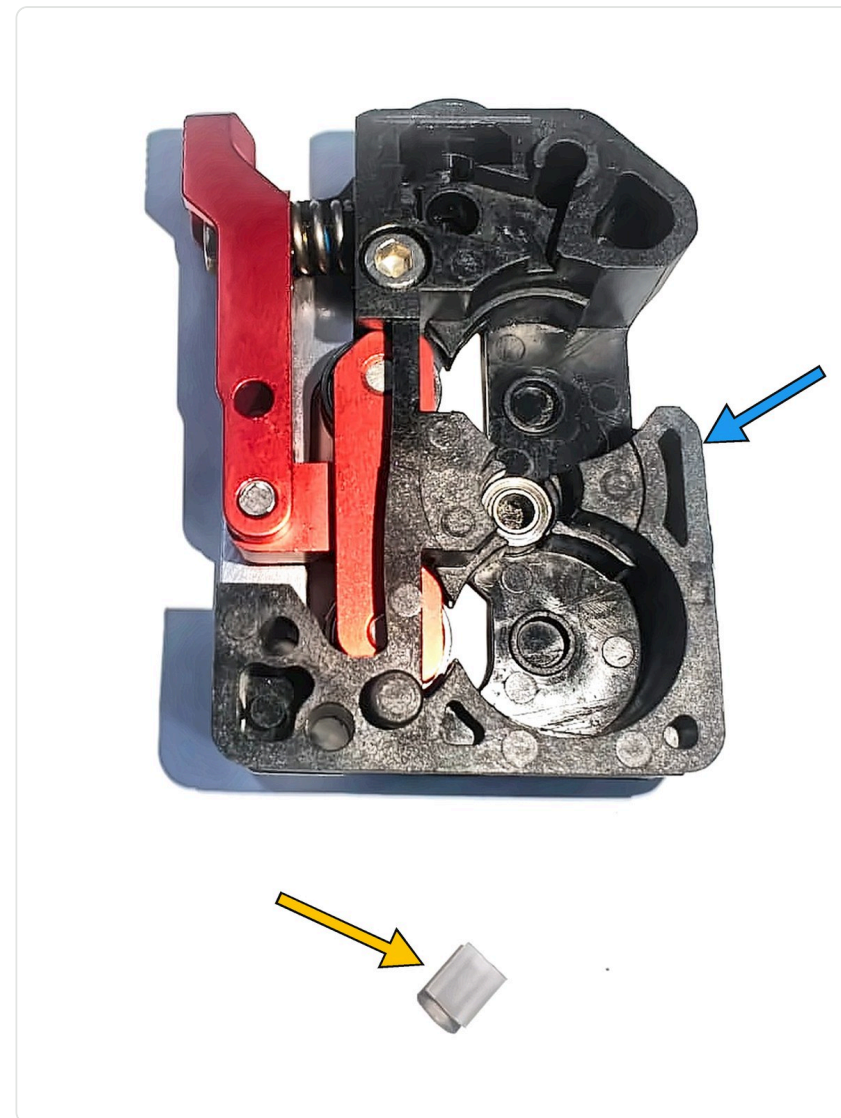




8 Preparing the PTFE insert

Step 8 of 22

- ✦ Cut a **5 mm** piece of **4×2 mm PTFE tube (I)**: 4 mm outside, 2 mm inside diameter.
- ❶ Cut it square with a sharp blade or a PTFE cutter. A crushed or angled end can catch the filament.
- ✦ Take the **extruder front body (G)**.



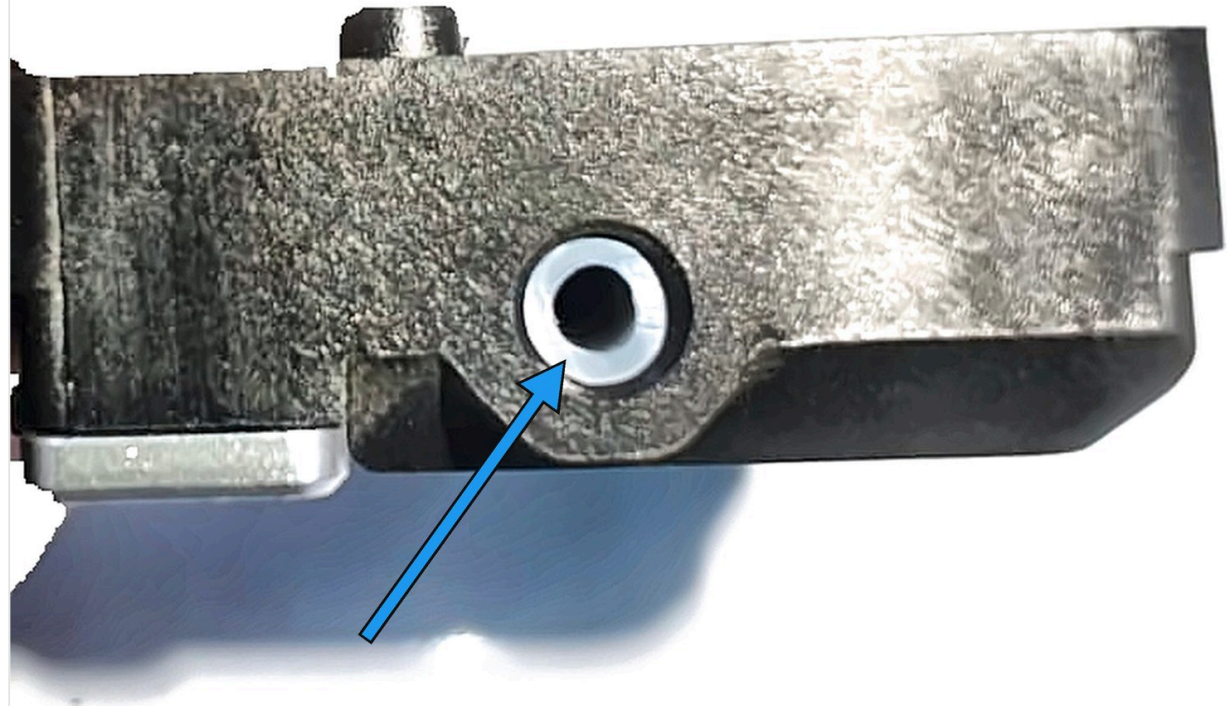


9 Inserting the PTFE insert

Step 9 of 22

- Push the **PTFE insert (I)** into the filament hole on the bottom of the **front body (G)**.
- ✓ The insert is fully in and its hole is clear and round.

BOTTOM VIEW





10 Inserting the trigger ball

Step 10 of 22

- Drop the **4 mm steel ball (J)** into its pocket in the front body.
- The ball is the trigger for the filament runout sensor. Loaded filament pushes the ball against the **runout switch (H)**. When the filament runs out, the switch releases.
- ⚠ From now on, keep the front body upright so the ball does not fall out.

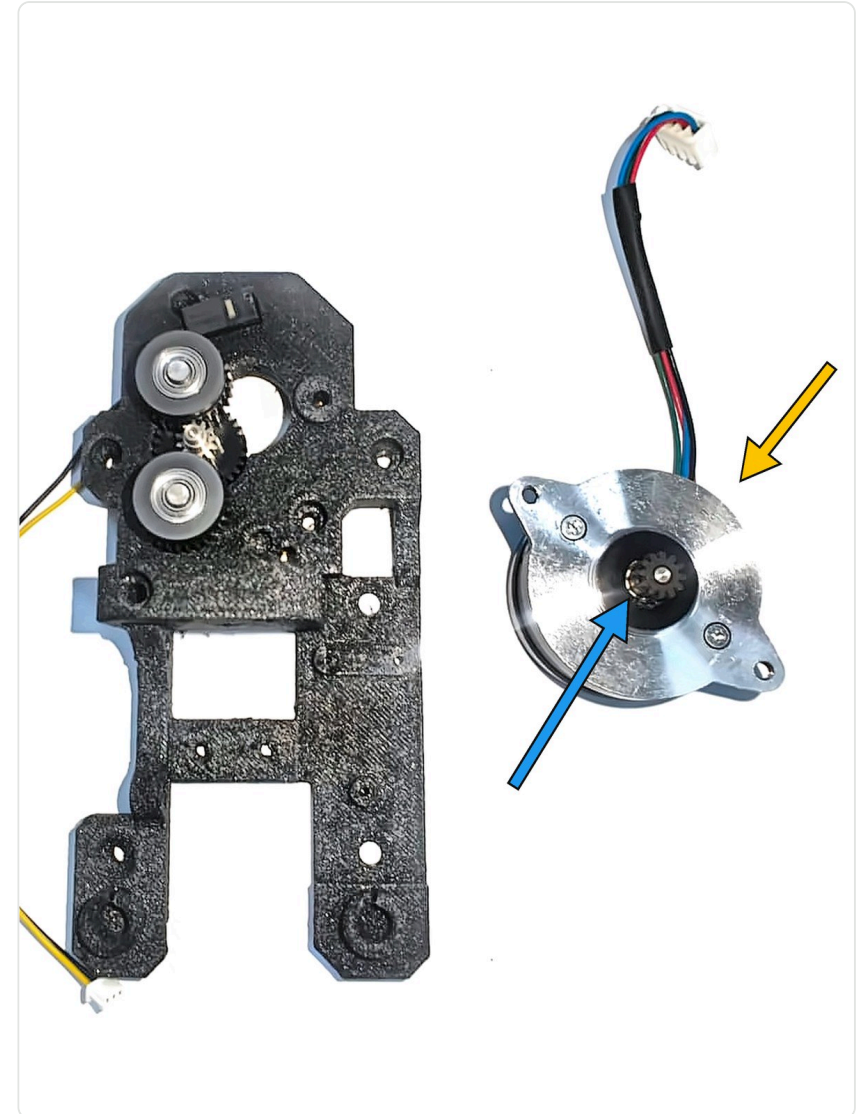




11 Preparing the motor

Step 11 of 22

- Take the **extruder stepper motor (K)**.
- The small **pinion gear** on the motor shaft goes through the large hole in the main body and drives the gears.

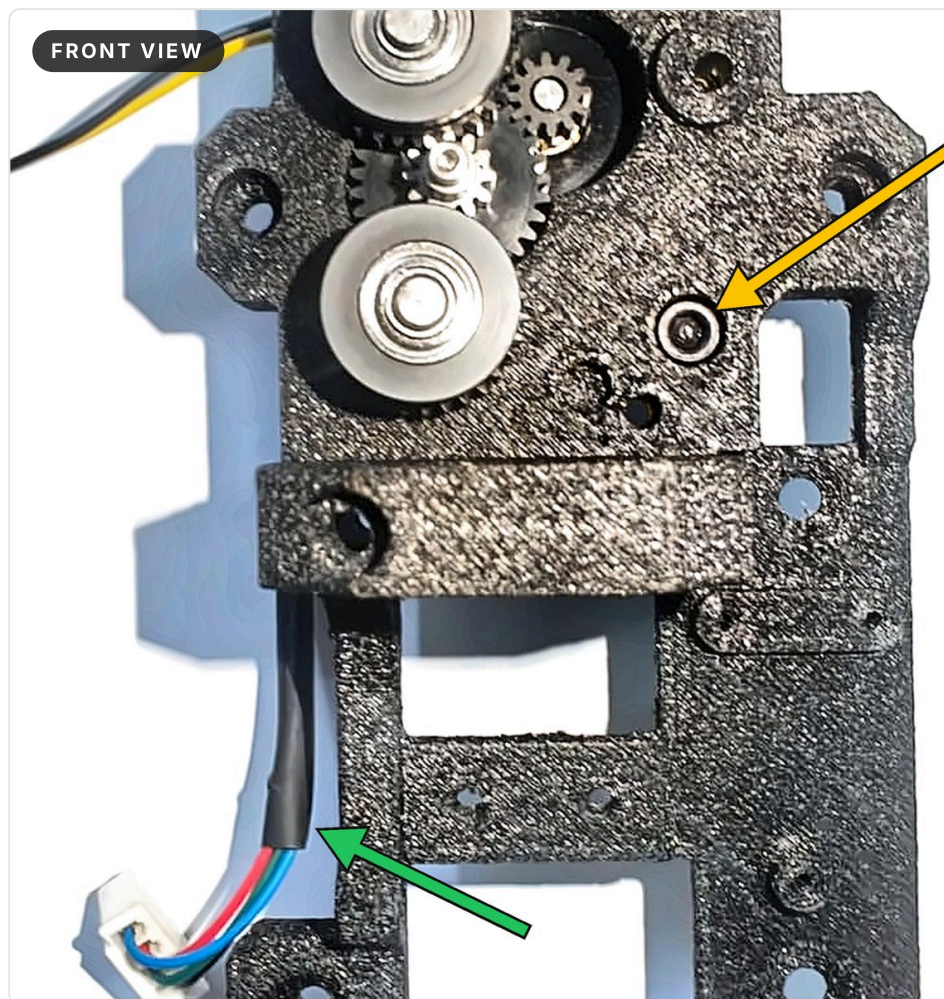




12 Mounting the motor

Step 12 of 22

- Place the **motor (K)** on the back of the main body, with its pinion through the large hole.
- Secure the motor with an **M3 bolt** from the front.
- Front view: the **motor wire** must come out on the **left** side.
- ⚠ Tighten firmly but do not crush the printed part.

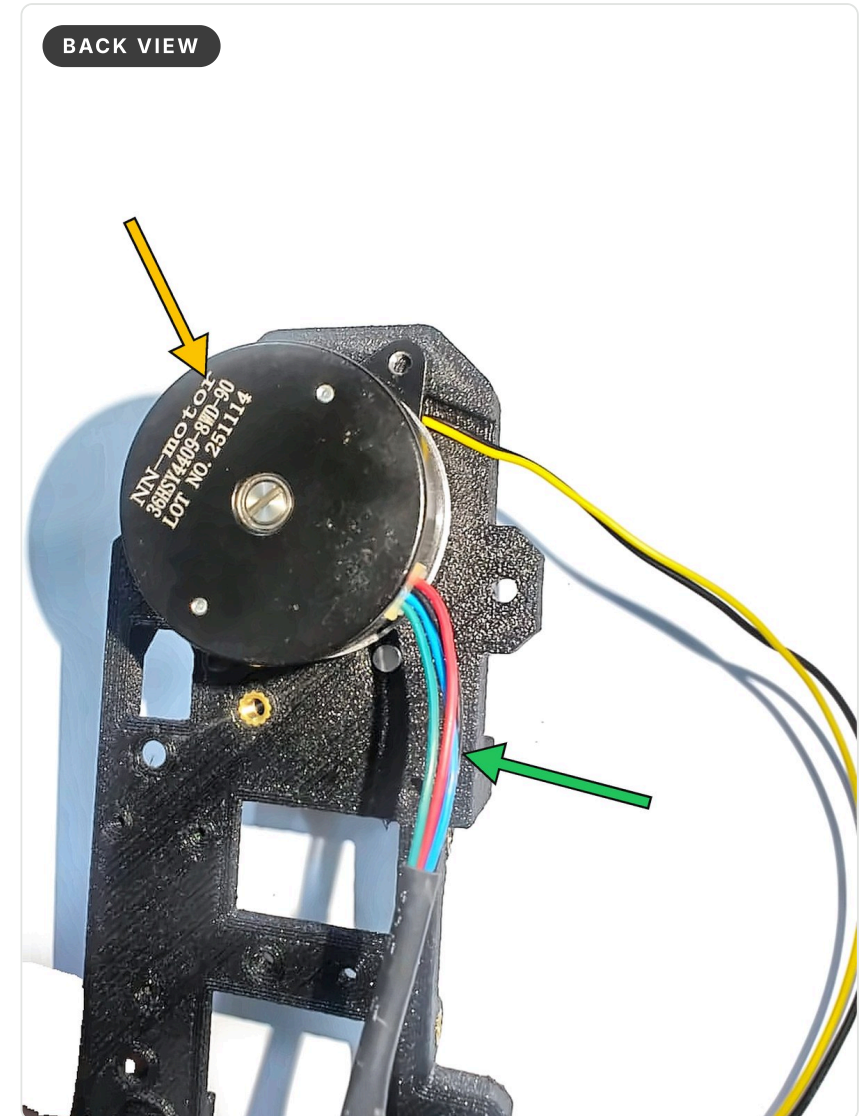




13 Routing the motor wire

Step 13 of 22

- Back view: the **motor (K)** sits on the back of the main body.
- The **motor wire** runs down the **right** side (back view). This is the same side as the runout switch wire.
- Turn the drive gears by hand. The gears and the motor shaft turn together without binding.





14 Setting the tension bolt

Step 14 of 22

- On the **extruder front body (G)**, find the **tension bolt** on the red-lever side. It is an M3 bolt with a spring.
- Fully tighten** the tension bolt **before** you mount the front body.
- ⚠** This bolt works in **reverse**. **Tightened = minimum** filament grip. **Loosened = maximum** grip. Fully tightened puts the lever in its most open position.
- i** You set the final grip after assembly, in step 22.

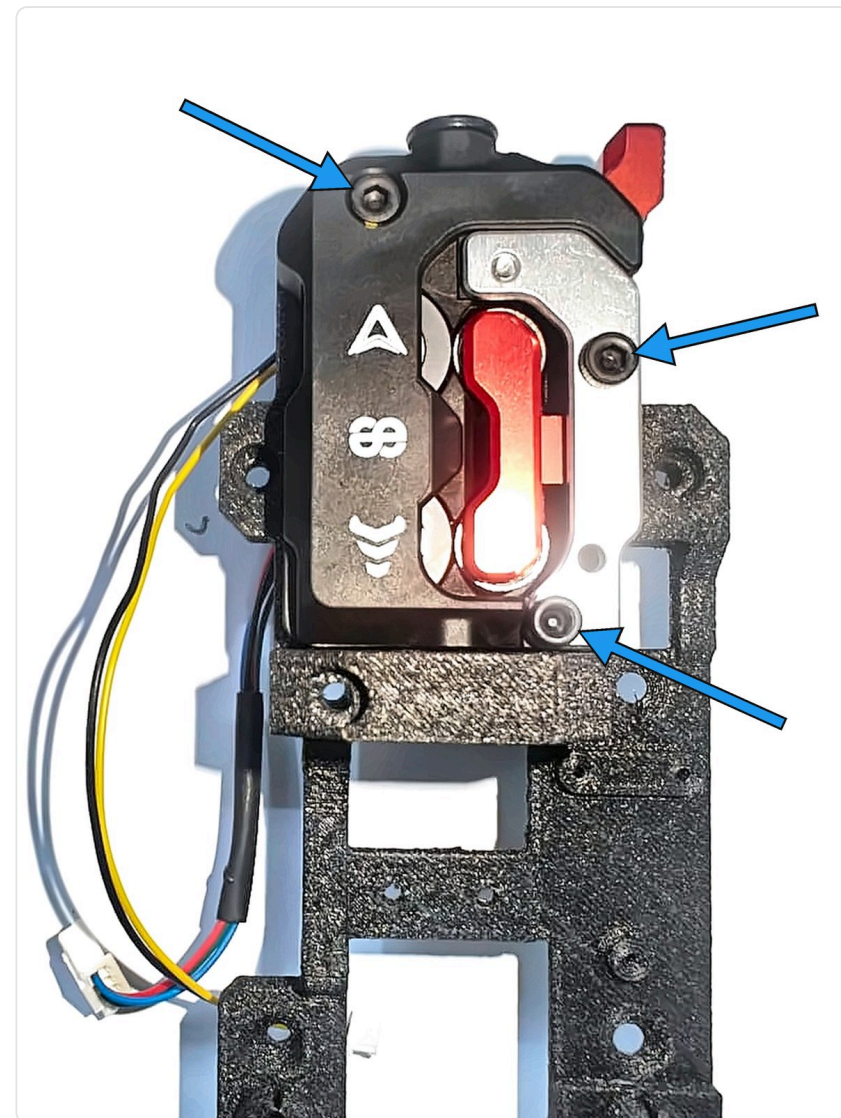




15 Mounting the extruder front body

Step 15 of 22

- Carefully place the **front body (G)** onto the main body. Keep it upright.
- ⚠ Make sure the **steel ball (J)** stays in its pocket and the **PTFE insert (I)** is still in place.
- With the tension bolt still fully tightened, fit the three **M3 bolts**.

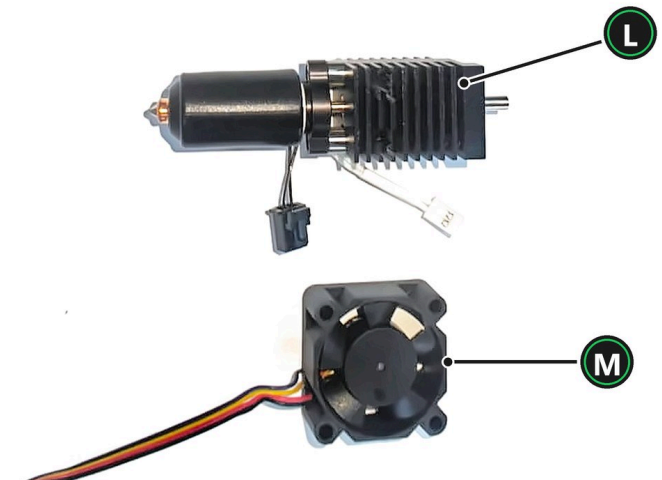
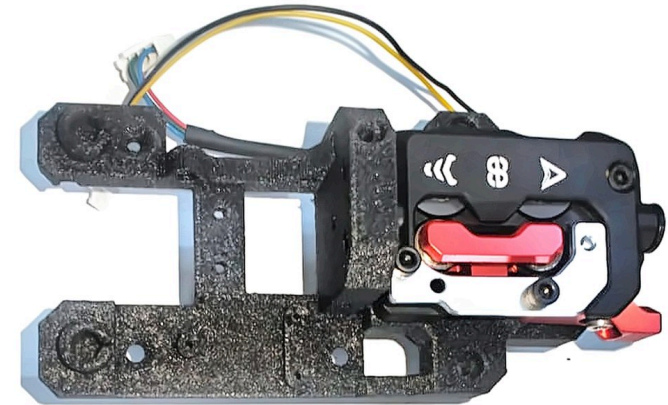




16 Hotend and fan parts

Step 16 of 22

- For the hotend stage you need:
- the extruder assembly from the previous steps,
- L** Hotend
- M** Hotend cooling fan

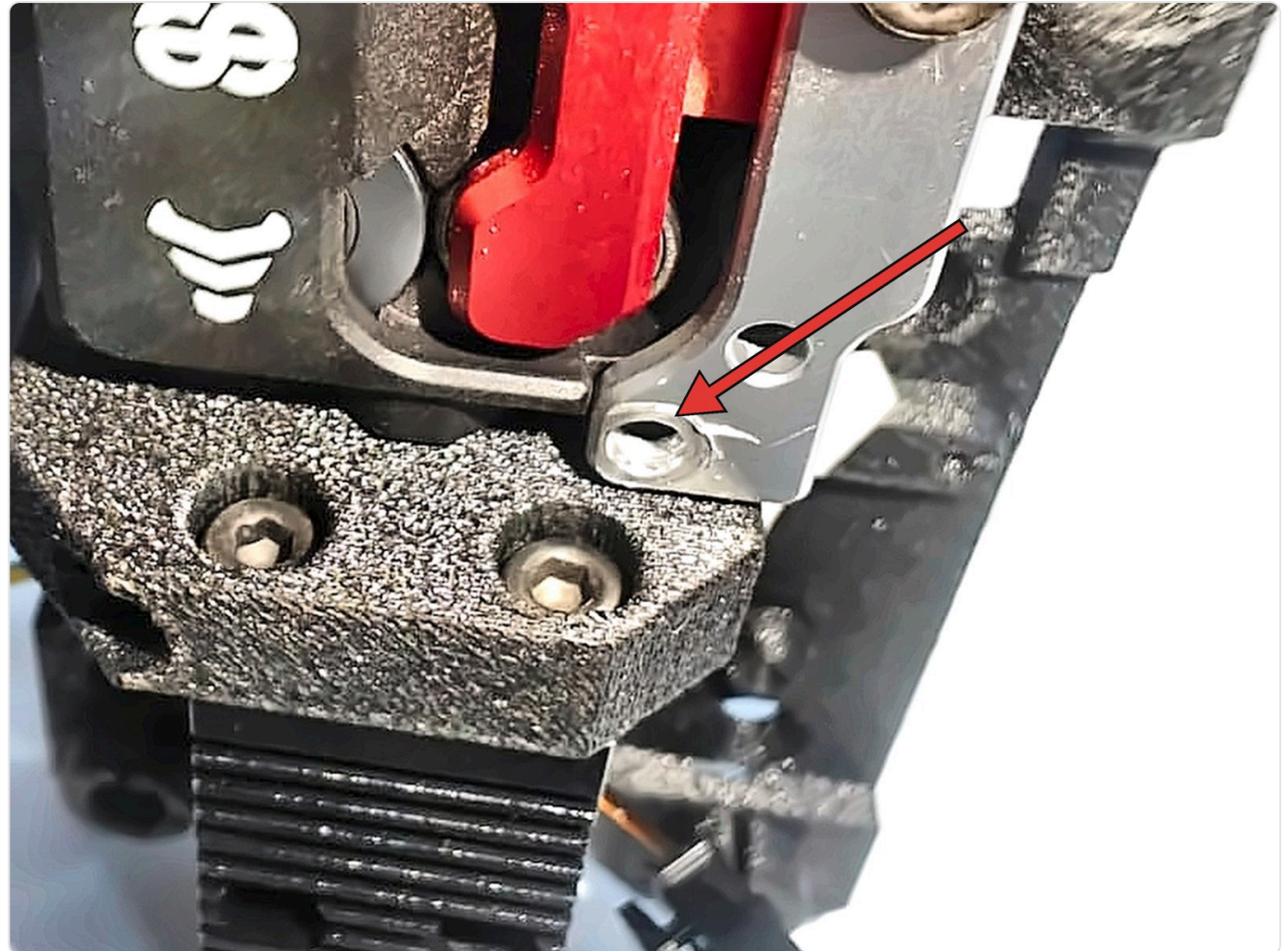




17 Removing one bolt

Step 17 of 22

- Temporarily **remove** the lower **M3 bolt** of the front body.
- Keep the bolt close by. It goes back in step 19.

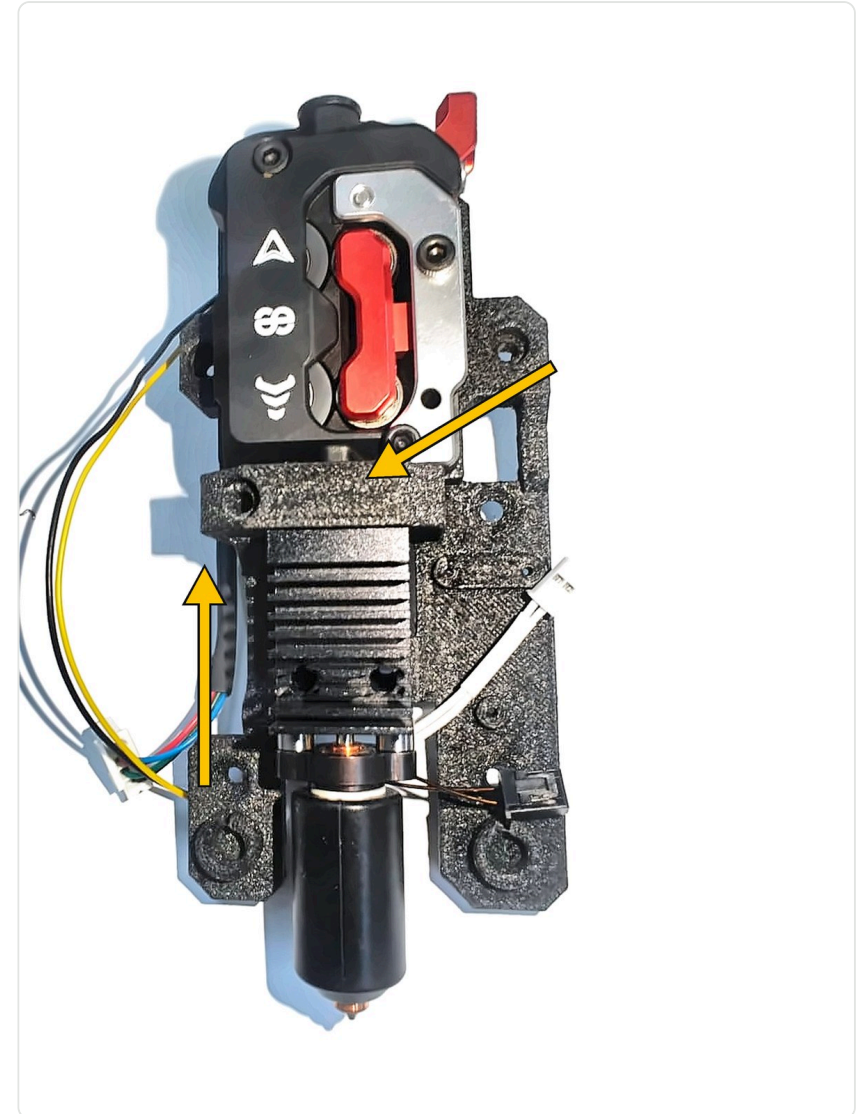




18 Inserting the hotend

Step 18 of 22

- Slide the hotend's **stainless-steel throat** up into the plastic clamp block.

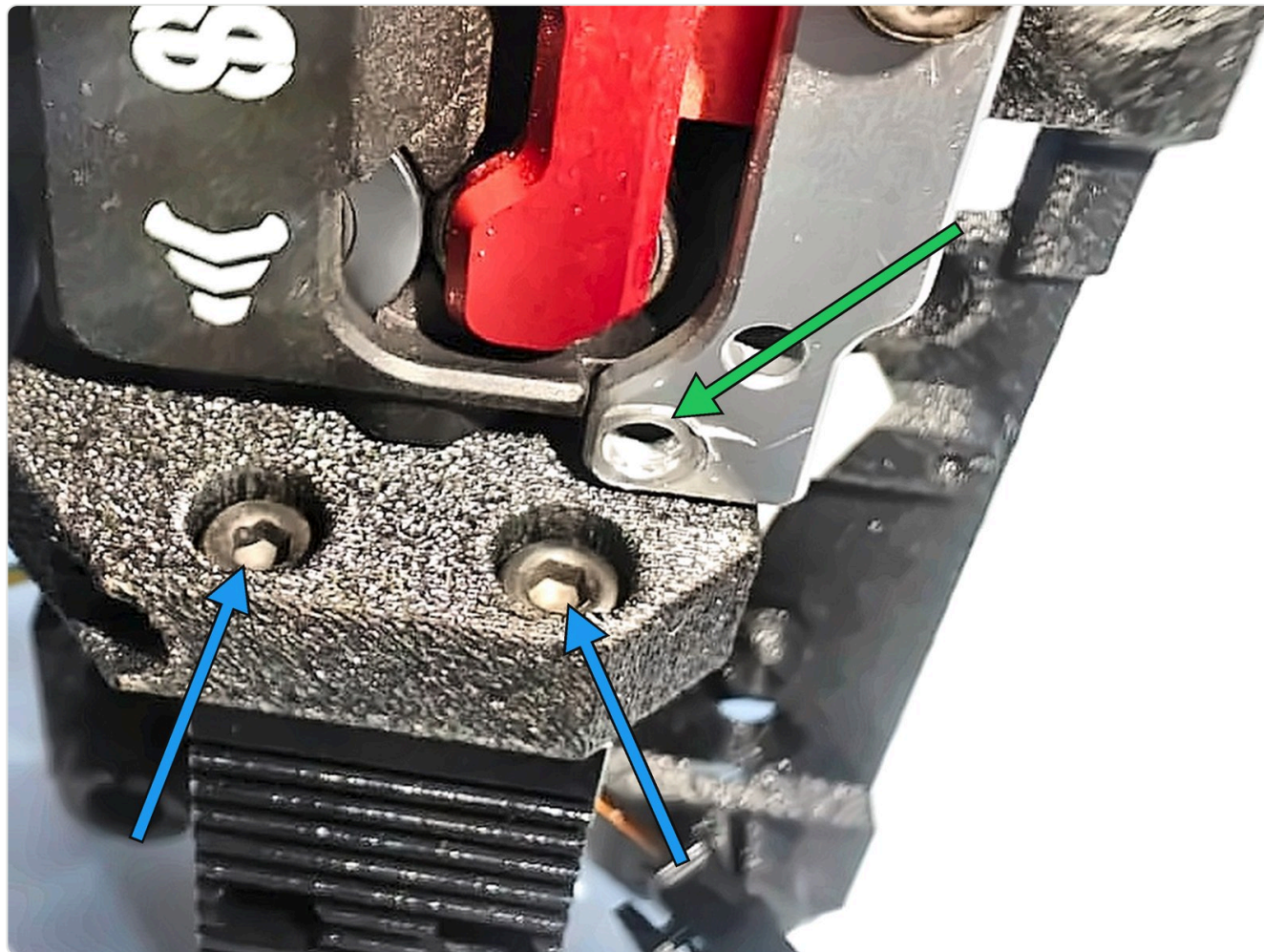




19 Securing the hotend

Step 19 of 22

- ⬢ Tighten the two **M3 clamp bolts** on top of the clamp block to secure the hotend.
- ⬢ Refit the **front-body bolt** you removed in step 17.
- ⚠ Do not forget this bolt. It holds the front body.
- ✓ Pull the hotend gently. It does not move or turn.





20 Mounting the hotend fan

Step 20 of 22

- Mount the **hotend cooling fan (M)** on the side of the heatsink with two **M3 bolts**.
- ⓘ The fan must blow air into the heatsink fins. On most fans the air comes out on the side with the sticker.

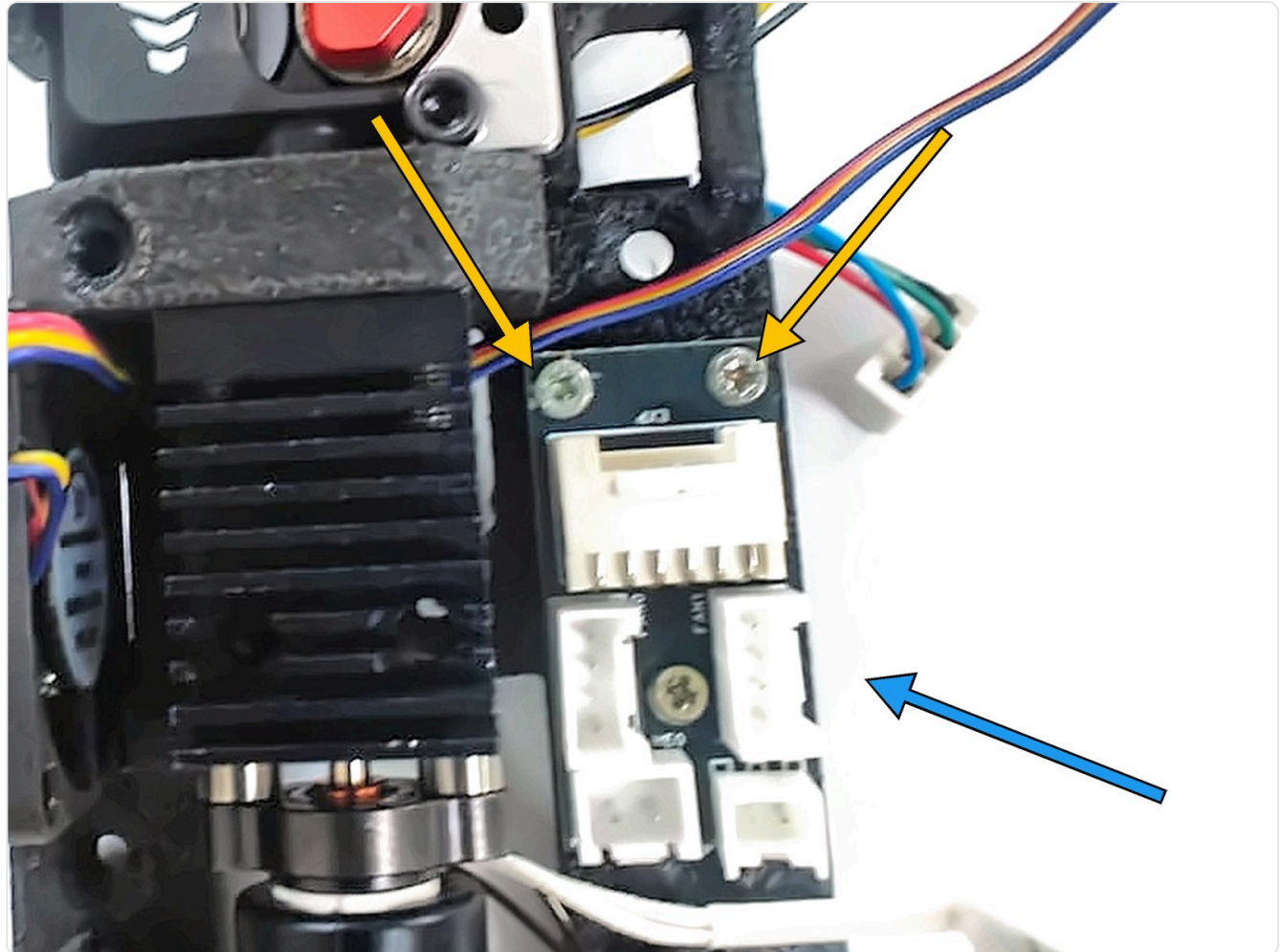




21 Mounting the breakout board

Step 21 of 22

- Fix the **toolhead breakout board (N)** with its screws.
- Connect the cables to the **breakout board (N)**.
- ⚠ Push each plug in until it is fully seated. Connect cables only while the printer is off.

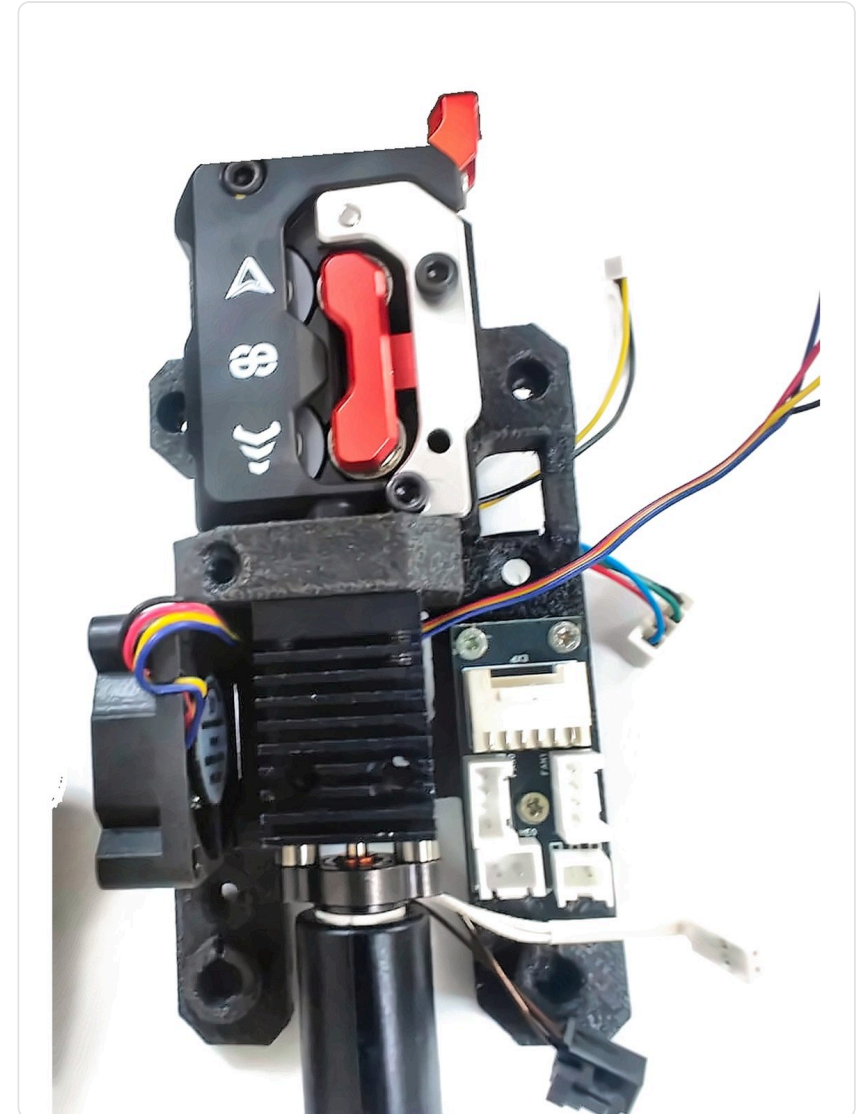




22 Assembly complete

Step 22 of 22

- Well done. Before you print, check:
- ✓ All gears turn freely by hand.
- ✓ Every bolt is in, including the one you refitted in step 19.
- ✓ No wire touches the heater block or the nozzle.
- ✓ Runout sensor: with filament loaded, the printer shows filament present. Without filament, it shows empty.
- ⚠ **Set the filament grip before printing.** The tension bolt is still fully tight (minimum grip). Loosen it step by step until the filament feeds without slipping. Remember: **loosen = more grip**.





Troubleshooting

Extruder & toolhead

PROBLEM	LIKELY CAUSE	FIX
Extruder clicks or skips, filament does not move	Tension bolt still fully tight (minimum grip)	Loosen the tension bolt step by step until the filament feeds reliably. Loosen = more grip. Also check that the hotend is at printing temperature.
Filament is chewed, plastic dust in the extruder	Grip too strong	Tighten the tension bolt a little (tighten = less grip). Blow out the dust.
Gears bind, motor hums or stalls	Dowel pin (B) not fully in, bearing (E) not flush, or a gear not meshing	Remove the front body and motor. Check that every gear turns freely by hand (steps 2 to 5).
Runout sensor always shows "no filament"	Steel ball (J) missing, or switch (H) fitted the wrong way	Check the ball is in its pocket (step 10) and the switch trigger is on the right (step 6).
Runout sensor never triggers	Switch cable unplugged or damaged	Check the plug on the breakout board (step 21) and the switch wiring.
Filament stops at the hotend or will not load	PTFE insert (I) missing, wrong length or crushed; hotend throat not fully in	Cut a new square 5 mm insert (step 8). Re-seat the hotend (step 18).
Hotend wobbles or sits crooked	Clamp bolts loose	Tighten the two M3 clamp bolts (step 19).
Jams after printing for a while	Hotend fan not running or mounted the wrong way round (heat creep)	Check the fan cable and the airflow direction (step 20). Never heat the hotend without this fan.

Problem not listed? Send us a photo or a short video on WhatsApp. Details on the back page.



Need help?

Our team helps you on WhatsApp. Send a photo or a short video of the problem and your printer model.

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