

Ooza cnc router, coffee 3d printer, and pen plotter

[Ooza](#) is our name for the large CNC rig in the basement. It's capable of basic 2D plotting, as well as soft material extrusion via an attached controllable air pressure regulator. We also have a dewalt router ready to be attached. Reach out to micro or lp for training and usage. (PW ooze)

[Wiki](#) for RatRig Killerbee (1510?)

[3D Model Viewer](#) (wants email for download)

Layout

[layout drawing](#) A0 Landscape (electronics left side) work area - 1189x841x95mm.

Tools

[Pen holders, sized for sharpies by @LP](#)

Pen Plotting Software

[List of pen plotter software](#)

[svg2gcode](#)

web: ooze

pi: oozaooze

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Ooza plotter toolheads

Pen holders, sized for sharpies

<https://cad.onshape.com/documents/a7004339719b8194c98d1ff1/w/2a43afa87741d7d332fc674e/e/eb8e0a1270b5742382a76c5a?renderMode=0&uiState=6902928b3060d2615aa58b48>

Motors

[LDO-57STH86-3004A](#)

Stealthchop

We set stealthchop motion because its quieter, and we set it from moves as slow as 5mm/s so that we don't get whiplash from switching between stealthchop (voltage-controlled) to maxspread (pwm-controlled) output at high speeds.

[Stall Detection](#)

Stall detection gives us virtual endstops on the maximum X and Y, and protection if a toolhead gets stuck on something.

Note! I am not sure if the rated torque should be 3.0A, or $3.0A * 2$ because there are two phases in the motor

A rough figure for the minimum speed in full steps per second (M915 H parameter) for which you should be able to get reliable stall detection is given by this formula:

```
min_full_steps_per_second_for_reliability =  
    steps_per_full_rotation * rated_current  
    * (actual_current/(sqrt(2) * pi * rated_torque_nm))
```

```
steps = 400
```

```
rated = 3
```

```
actual = 0.8 Amp
```

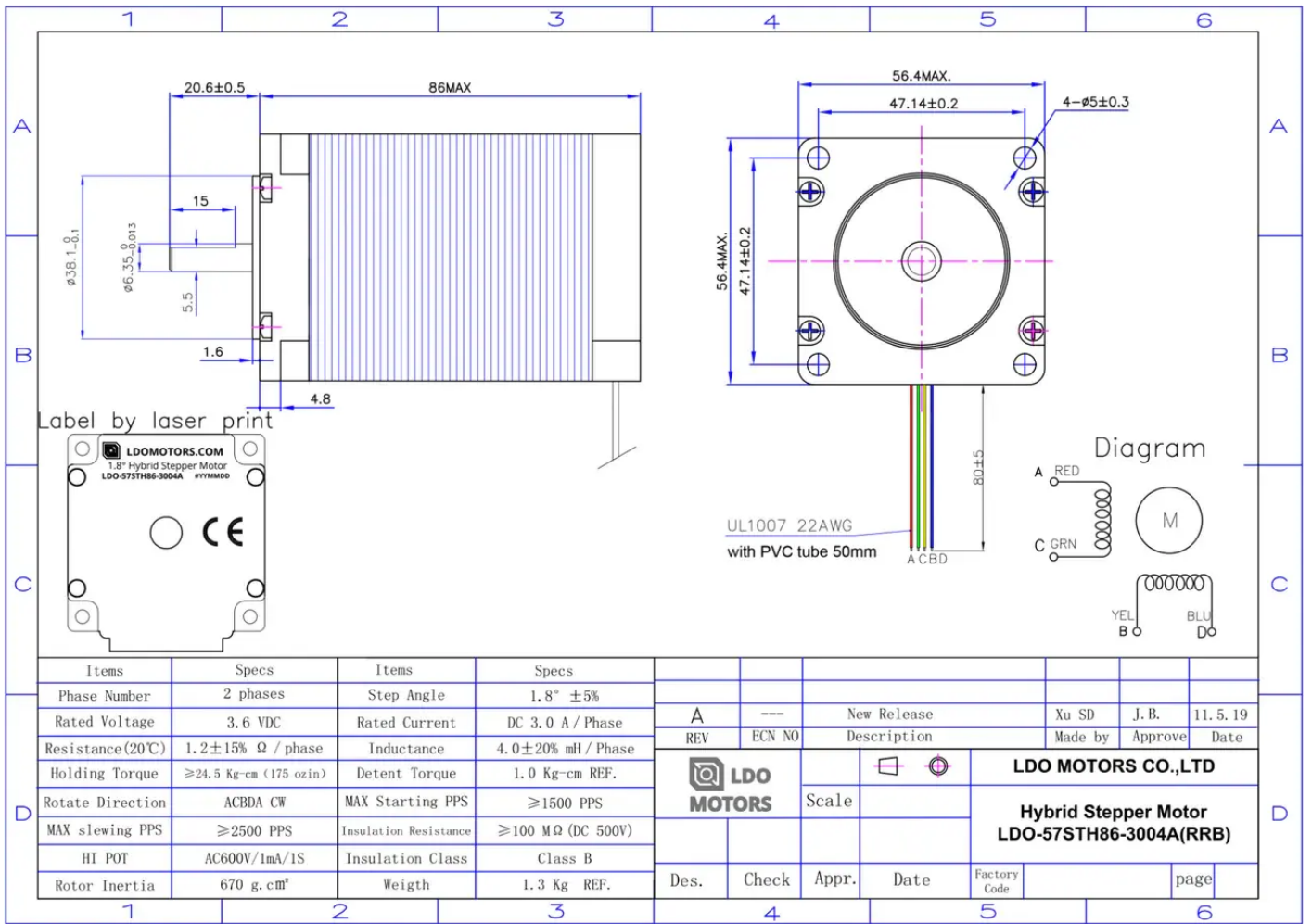
```
pi = 3.142
```

```
sqrt(2) = 1.414
```

```
torque = 2.4 N/m (from 24.5Kg-cm)
```

```
actual / (sqrt(2) * pi * torque) = 0.075
```

```
steps * rated * 0.075 = 90
```



Biomaterial Recipes for 3D oozing

MATERIALS + RECIPES

[Fiona Bell / Leah Beuchley Biomaterial Recipes for 3D Printing](#)

[Materiom materials reference database](#)

[Collection of recipes and experiments from 2022 MICA class](#)

[A.LIVE Bioplastic Cook Book - Great examples and descriptions](#)

STARTER MATERIALS:

BIOPOLYMERS: (thickening, durability, texture, strength)

Agar, carrageen, cornstarch, potato starch, alginate

PLASTICIZERS: (flexibility)

glycerine, sorbitol

ADDITIVES: (various qualities- stability against shrinkage if too much water)

vinegar, sunflower oil, soap, baking soda, clay powder, fiber, wax, eggshells, coffee grounds, orange peels

3D PRINTER SLICERS FOR BIOMATERIALS

[Hand + Machine various SLICER for 3D printing with Biomaterials](#)

[Test print STL files](#)

Some recommended tools to get set up for 3D oozing with biomaterials:

[Eazao Heater](#) added to print head suggested for uniform printing qualities

Food dehydrator - to prevent uneven shrinkage and cracking

[Screenshot 2026-05-29 at 6.12.47 PM.png](#)

OOZA Biomaterials printing log + TO DO

(heck- 8/29) Gcode scripts needed:

- Some command to pause oozing when ooze in tube is running low, before it runs out. This could be based on time running with a certain pressure, or based on a sensor reading the amount of paste. Ooza should STOP before the paste runs out to enable tube change or adding of material to tube.
- Some command to "go poop in a corner" after reloading of material: The material will extrude a small amount and smear the ooze outside of the print zone (in a far corner of the workspace, to clear the nozzle if paste has dried at the tip of the nozzle).
- Some code to

control buttons for

- open solenoid
- close solenoid
- set pressure to zero
- set pressure to 10%
- set pressure to 90%

Ooza gcode controls

Solenoid

This is something that pinches the air supply completely, like 'pen down' and 'pen up'

Configured with `M950 P2 C"out7" Q65535`

Open regulator? with `M42 P2 S1` turns the green light on

Close regulator? with `M42 P2 S0` turns the green light off

Pressure Regulator

This is what controls the output of the compressor

Configured with `M950 F0 C"out9" Q500; M106 P0 C"regulator" H-1`

No pressure with `M106 S0`

Half pressure with `M106 S0.5`