

3D MODEL ONLY

#NLR35 digital Nanolongrange FPV drone



Unboxingexperience7

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Summary

121g light digital FPV drone with GPS; powered by single 21700 cell; >23min flight time, >2km range and >10km distance.

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Hi guys,

welcome to my new Nanolongrange FPV drone design! This is the 4th and most sophisticated iteration. The design builds on my previous completely 3d printed frame NLR35. The goal was to make it lighter, more powerful and yet fully integrate battery and GPS mounts. Moreover, I decided to switch to a new digital FPV link system, Walksnail. It provides better image quality than analog and HDzero and is lighter than DJI. Finally, it records HD footage onboard and on goggle's DVR.

Please feel free to print, mod and share your builds with the hashtag **#NLR35**.

Key features:

- 121g AUW with 1s 21000 Lilon (optional 18650 (-18g))
- magnetic battery connectors
- Walksnail digital FPV system
- GPS
- ELRS
- 1203 11500kv motors
- 3-3.5" props

Initial flight test results

- >23min flight time
- >10km distance
- >2km range

Parts and build:

The main frame is cut from carbon fibre and not 3d printed to save weight. Basic knowledge of soldering and FPV drones is strongly recommended.

Frame:

You need to cut the main frame from 1.5mm carbon fibre. Use the enclosed .svg / .dxf file. There are plenty of local and online CNC shops which can do the job for you. The most affordable option is probably Sunlike/Senlai in China. You can buy from them on [Aliexpress](#) too, just message them and ask for a quote. It's around 8\$ for the frame + shipping.

I printed camera, battery and GPS mount with PLA+. You can go as low as 20% infill except for the smaller parts where I recommend 99% infill. I'm happy with [Esun PLA+](#).

AIO:

I use a [DarwinFPV 15A 1-3s AIO](#) because it features 2 free UARTs. It has an integrated SPI ELRS receiver but you can use an external antenna. Install a Happymodel ELRS antenna to save weight (>1g). Unfortunately, it has no current sensor to display current draw during flight.

You need 4x M2x20 screws and 7x M2 nuts. I recommend using plastic to save weight (>2g)

Motors:

I use [Flywoo 1203 11500kv motors](#). They are about 1.5g heavier than standard [1202.5 motors](#) but provide more punch.

You need 8x M2x4 screws, 2 for each motor. Use titanium screws to save >1g.

Props:

Gemfan 3018 works great. Gonna do more testing, there might be other good options too. Props up to 3.5" will fit.

GPS:

There are currently only 2 small lightweight GPS options available: NLRC and Flywoo Goku Nano GPS V3. Both will do the job.

Battery:

Sure, you can use a lipo. But for longer flights you need higher capacity. I found GNB 850mAh to be the highest capacity 1s lipos on the market. The weight is around 18g which equals around 47mAh/g.

Lilon has higher energy density and is available in high capacity formats. 4800mAh with 45A draw and 67g is already a great option. That's 71mAh/g! The largest suitable 1s Lipo (by GNB) I know has 18g for 850mAh. That's 47mAh/g or 33% less. You can go lighter with 18650 but I found that flight time and motor power decrease.

I recommend the following batteries:

21700: Molicel P45B or P42A; Samsung 40T is the low budget option; Samsung 50S is a fancy new battery which works too but lacks power for my taste (and is 5g heavier);

18650: Sony VTC6

In Europe these batteries are available at www.nkon.nl

Magnetic battery connectors:

I developed and tested the magnetic battery connecting system. Although it is very simple and lightweight, I'm trusting it. If you want to use a different connector use GNB27 (lighter) or XT30. BT2.0 may work too, but it will probably be limiting the quads power as it may not deliver enough current. I don't recommend PH2.0 due to its current limitations.

For the magnetic connector you need 2 small pieces of Nickel strips and 2 strong 5x2mm neodym magnets.

FPV:

Feel free to use analog (lighter), HDzero (faster link) or DJI (too heavy and not 1s). I'm happy with Walksnail. Go for the 1s lite VTX. You need to 3d

print the adapter to mount the lite camera as it has no mounting holes. I decided to solder the VTX directly to the battery-in on the flight controller. This will lower your bandwidth but makes the build simpler and lighter. Take care not to go below 3V during flight as this will cause the VTX to fail. Alternatively, you can use a 5V step up module or connect to the flight controllers BEC. However, I don't recommend any of this options as below 3.0V the quad is underpowered and the BEC probably won't deliver the necessary current.

By using this [referral code](#) you can get yourself a 10\$ voucher and me 5\$.

Antenna:

Antennas are a prerequisite for good FPV range. Use only high quality antennas. On the VTX I recommend TrueRC's Smol antenna due to its weight (0.4g) or for even better range TrueRC Singularity (both around 1.4g).

On the VTX I tried the included stubbies (1.2km range), Menace LHCP patches (1.7km range) and 14dbi triple patch antennas (2.11km range). When flying FPV with patch antennas you are supposed to direct the antennas towards the drone. I'm not good at that because I like to put my head down when flying. So you can probably get more range.

Walksnail Goggles probably provide even better range as you can use 4 high quality antennas.

Model files

gps_mount.stl

 99% infill

walksnail_cam_lite_adapter.stl

 99% infill

18650_mount.stl

 optional

cam_mount.stl

 99% infill

21700_mount.stl

☐ 20% infill, print 2x

18650_adapter.stl

☐ adapter to use 18650 Lilon batteries in 21700 mount

nlr35cf.stl

☐ .stl of the frame for test printing / conversion to 2d carbon cutting format



nlr35cf.dxf

☐ first svg and dxf files were out of scale (100x), this one should work



nlr35cf.step

☐ step file

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