

Diana-2 FES First Impressions

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WHAT DO YOU GET FOR YOUR MONEY?

Buying and flying the Diana-2 FES

I have received many questions about the Diana 2, so this is my attempt to answer the most frequently asked questions.

I have flown my Diana for just a week now which isn't enough time to do a full review.

Overall, I think that the ratio of what you pay and what you get is the best on the market.



CUSTOMER EXPERIENCE

It was evident from the beginning until the end of the purchase and delivery process that I was not dealing with an organisation that had all the processes established and polished out. Avionic is still learning how to deliver the end product. For example, the delivery time frame was not managed in the best way, the glider was delivered without the tail dolly, manuals were not ready at time of delivery, etc.

I think that Avionic has a good product, but if I were to point out the weakest link, it would probably be the lack of a more structured delivery process and compartmentalization.

My communication with Boleslaw Kawik and the rest of the team at Avionic has been very good. They rectified all the snags I had pointed out. I believe they are genuinely good and honest people, and for this reason I would always do business with them.



ON THE GROUND

Rigging and Derigging?

Very simple and straight-forward. Elevator and ailerons have to be manually connected using a system that I like much better than L'Hotellier connectors.

You can't rig the Diana on the trailer ramp, as would be the case with most sailplanes. The center-spar gets in the way of taking the wings out of the trailer. You need to get the fuselage off the trailer completely and move it 3 meters or so backwards. With my trailer ramp, I need somebody to help me lift the fuselage dolly off the ramp. This issue was corrected with s/n 4 and Matthew has the new ramp, so one-man rigging is now possible.



Since the fuselage sits quite high in the trailer (centre-spar is above the wings), the trailer is taller than what you'd expect for a single-seat sailplane. The first time you see it, you might think that there is a Duo Discus inside!

Fuselage dolly is well designed and makes the whole operation very simple.

The only issue I have had so far is very small clearance to the vertical stabilizer when you lift the tail to take the fuselage out of the trailer. You should not lift the tail boom more than 5 cm. I did manage to hit the rudder while pulling the fuselage out. I believe Avionic should look into exchanging trailer gas-shocks for longer ones.

Mass and Centre of Gravity

We have weighed the sailplane on calibrated scales to accurately measure the CG in the take-off configuration.

Configuration	Empty Mass	Arm	Permitted CG Range
Factory supplied Weighing Record	261.7 kg	46 cm	45.6 cm – 52.7 cm
Measured Empty Mass	264.5 kg	45.6 cm	
Take-off Mass (No Water) - measured	354.0 kg	24.99 cm 26.82 % MAC	20.17 cm – 36.18 cm 19 % - 45 %
Take-off Mass (Tail Water Only, 5.6 lit) - calculated	359.6 kg	31.95 cm 38.14 % MAC	

The difference between the factory supplied weighing record and our measurement is due to the fact that the bug wiper system and a backup logger were installed after the initial weighing was performed.

It can be seen that the glider was delivered with the CG on the forward limit. The s/n 4 has 9 kilos more and the CG is 2 cm further aft. Perhaps new 5kWh batteries weigh more.

Calibrating the pitot-static system

The pitot-static system was checked using a digital calibrated air-data tester. There was virtually no leak and the installation is very well done.

The Winter airspeed indicator showed an error of up to 4 km/h, but the LX V8 vario was consistently at -1 km/h throughout the test range. We applied the 1 km/h correction through the LX9050 and after that the V8 was within 0.5 km/h !

Interestingly, the indicated airspeed displayed on the LX9050 did not match! The difference was about 20 km/h and it was not constant throughout the test envelope. I did not manage to figure out why, since the LX9050 receives IAS from the V8. In the end I removed the IAS tape from the LX9050 and used only the V8 for all measurements.

Unfortunately, there was not enough time to measure the pitot-static position error, so we are relying on the AFM data.

Surface finish



Diana 2 is painted with Acrylic paint and the finish is beautiful.

I smile every time I look at these amazing elliptical wings. Not a straight line anywhere!

FLYING THE DIANA 2

Sidestick?

Probably the most common question I get and something that scares some folks away.

Since I fly other aircraft that are equipped with sidestick, I wanted to have an opinion from somebody who has never flown sidestick. I have had my friend Damir, who is an experienced FI(S) and has never flown sidestick before, fly the Diana.

We both agree on the following:

It feels completely natural and I don't expect that any pilot with normal flying skills would have any issue. Once you start the take-off roll, you simply forget about it.

Matthew noticed how the LX remote stick on my Diana effectively extends the sidestick. The arm position is a bit different than with the original Diana2 sidestick. I find it good and I love the LX remote.

Sidestick with LX remote extends almost to the centre of the cockpit.



Original Diana-2 Sidestick.



Can you Take-off with FES?

The AFM does not permit self-launching. The reason is the CS.22.925 rule which states that the propeller must have at least 230 mm of clearance in level attitude (the most critical case for the Diana). There is about 10 cm of clearance available.

The Diana-2 is an EASA certified sailplane, however, the FES equipped Diana's are not yet included in the TC. This means that at this moment, a Diana-2 FES is not an EASA aircraft! My Diana-2 currently flies under UL rules. Since CS.22.925 does not apply – we could get away with self-launching.

Perhaps it is time to amend CS-22 to allow FES powered sailplanes to self-launch. It's good for the environment, it's good for the sport, and I don't think that the risk with these super light-weight and short propellers is an issue. The severity of the outcome of an occasional FES prop strike is probably low. There is currently one CS.22.925 ESF open with EASA where a manufacturer is applying for alternative means of compliance for take-off with FES, so things are moving in this direction!

Little fairy tells me that you'd take off within 250m on a grass field at 40 kg/m², and within 200m on a paved surface 😊

How far can you fly with FES?

With a simulated take-off and climb to 600m at 40kg/m², I usually end up with 55% battery capacity left.

On one occasion I managed to switch the FES off at 600m AGL with 80% battery left when I quickly found a thermal and climbed in that thermal.

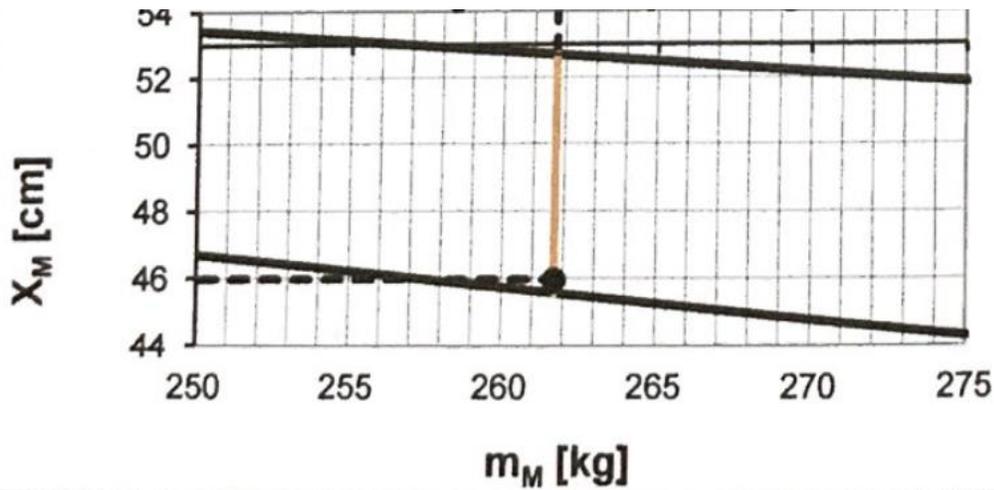
It takes 4kW of power to sustain level flight at 100 km/h. My battery capacity is 4kWh, so you can do the math!

Matthew already has the new 5kWh battery on his Diana-2 s/n 4. This is 25% improvement and I am looking forward to replacing my batteries with the new ones!

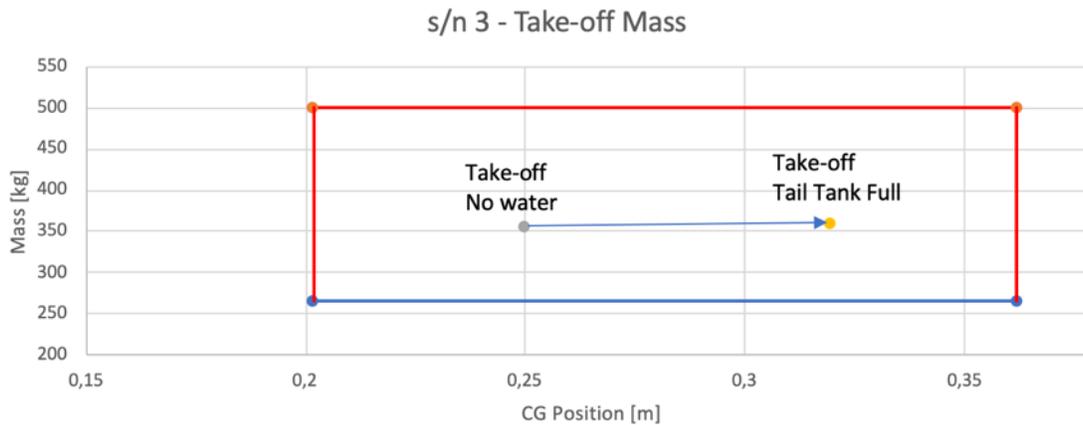


Forward Centre of Gravity

Empty weight CG is exactly on the front limit as can be seen on this graph below.



With tail tank full (5.6 litres), the CG moves aft to a more reasonable position.



Without any water in the tail tank (CG at 0.25 m) and trimmer in the full aft position, the sailplane is in trimmed at a speed slightly above 100 km/h. It is very stable, but of course requires constant back pressure to thermal. Matthew had the same issue and he adjusted his trimmer as per procedure described in the maintenance manual and found it ok afterwards. I have not tried doing that, so this is something to look into. With full tail tank, it flies beautifully.

Airbrakes and Flaps

Starting with s/n 4, Avionic has changed the Flaps, Airbrakes and Landing gear controls.

Landing gear is now electrical, which frees up space and mitigates the risk of "unlocking" it on the ground. The additional benefit is that it also frees up enough space behind the seat which allows for the installation of an oxygen bottle! Great upgrade!

The original flap handle is too far forward for my taste. Before my third flight, I was fiddling with it, trying to adjust it and didn't put the locking screw back on. During the flight, I managed to pull the flap handle off the actuating lever. I wouldn't want that to happen in a competition.

New flap handle and airbrake levers are really good and I am really looking forward to this upgrade on my Diana.

It is good to see Avionic responding to customer inputs and making modifications.



PERFORMANCE

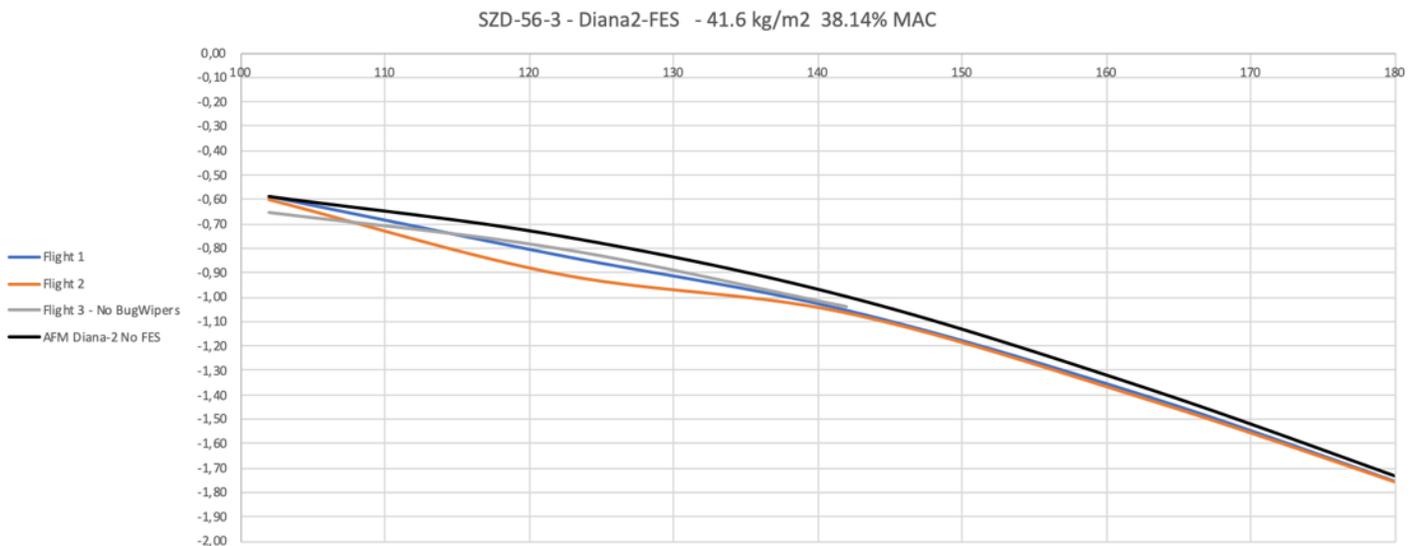
Since the Diana-2 has been flown in so many competitions, I believe that the only interesting questions are whether FES changes performance drastically and how much of an effect do the bug wipers have?

Performance Collection Flights

Due to work schedule I had only one day available where I could do any measurement-gathering flights. Unfortunately, the atmosphere did not play along.

Late in the evening, I managed to perform three aerotows and two FES-powered climbs back to altitude. The data in the graph is corrected for static-error, instrument error and to ISA. The data-scatter due to atmospheric instability is evident. Air vent was open and sliding window was closed during all flights.

Until I have a better opportunity to do some serious data-gathering, this at least gives an initial picture of what we are dealing with.



Fly safe!

Bruno