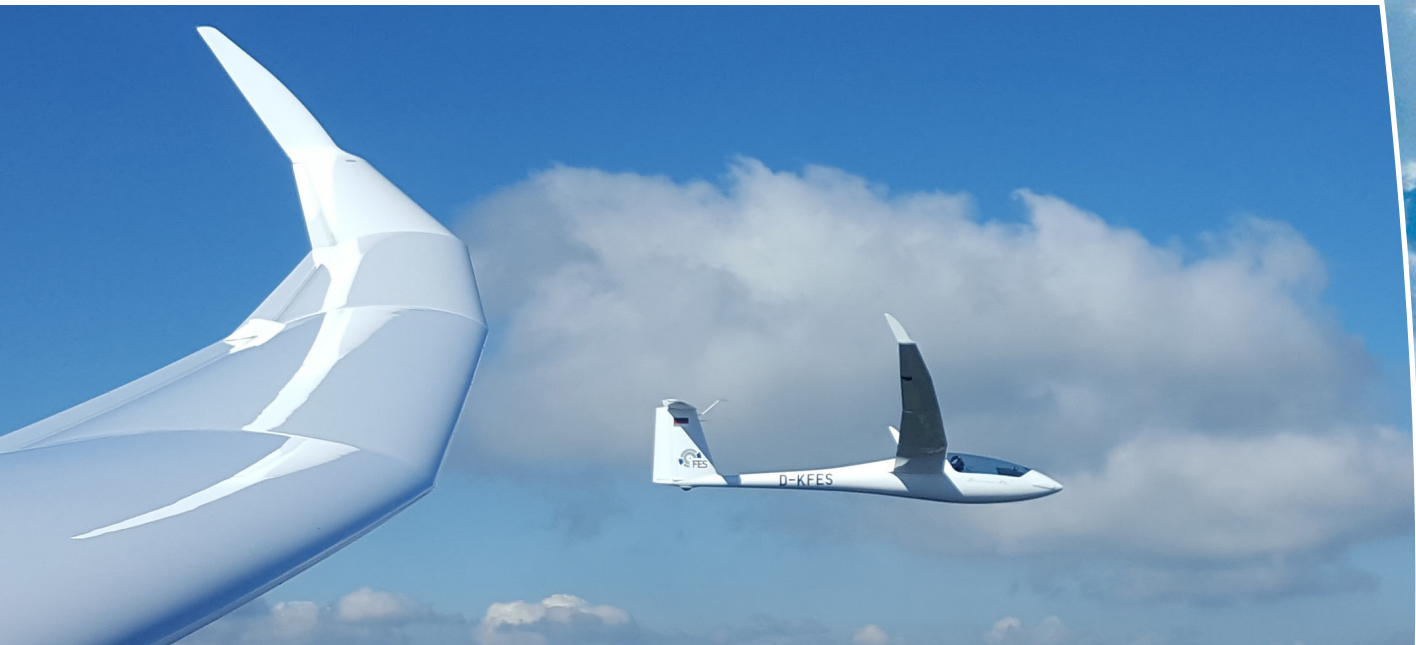




**FES**<sup>®</sup> 200 FES equipped  
sailplanes flying worldwide

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FES (Front Electric Self-launch / Self-sustainer system) is innovative propulsion developed for high performance sailplanes



## EXPAND YOUR HORIZONS

... and give yourself the ultimate freedom of soaring, by going places you would never have dared before! The future lies in maximizing flying fun, without all the fuss and risks related to landing out. FES is the solution for all those pilots who wish to soar into a safer and more independent future.

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## Front Electric Self-launch / Self- sustainer

We have revolutionised the future of gliding with the development of a highly innovative and extremely effective propulsion system with a light but powerful brushless electrical motor and small and folding propeller in the nose of the sailplane.

We named it Front Electric Self-launch / Self-sustainer – FES.



### Why Front?

With a front engine, there is no additional drag of extended propeller arm, meaning less power is needed for equal performance. Less power means fewer expensive batteries and a smaller engine, resulting in less additional weight and costs. Motor starts and stops instantly without any altitude loss. In this manner, we get the best sustainer system available for sailplanes.

### Why Electric?



The powerful electric motor is much smaller and lighter than a comparable combustion engine. It is easy to operate. No warm up is needed, just power switch ON and rotate throttle knob. It immediately gives full torque from zero to max RPM. Electric propulsion produces minimal noise, is clean, odourless and vibration free. The system is simple, reliable and with only a few rotating parts, virtually maintenance-free. Last but not least, the electric propulsion is environment friendly and leaves a significantly lower carbon footprint - especially with solar panel charging.

### When and why to use FES?

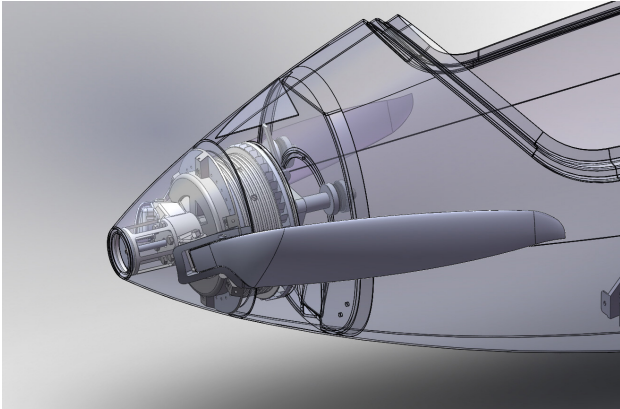
An electric motor with a folding propeller can be safely started at low altitude, which is very important feature on days with low cloud base and weak thermals.

At maximum power setting, you have a good climb rate available, to reach a safe altitude, then power can be reduced for horizontal flight to the nearest thermal or to your home airfield. For level flight only 4-5kW of power is required which means about one hour of endurance, allowing you to cruise a distance nearly of 100 km.

In case of system failure you can still land safely, as pure sailplane, without the additional drag of an extended propeller and motor.

During aerotow you can always release low in the first thermal and cut down expensive towing bills! When using winch or auto tow, FES could greatly expand your horizons.

**Discus 2c FES, HPH 304ES, LAK17B FES - certified by EASA**  
**Silent 2 Electro - certified by DAeC**



## TECHNICAL DATA

### FES is available in two configurations

- as self-sustainer system for heavier EASA sailplanes
- as self-launch system for lighter sailplanes

### Motor

- Specially designed for FES
- Outrunner BLDC brushless synchronous with permanent magnets, electronically controlled commutation system 3 phase
- 22 kW of max power
- Length: 100 mm
- Diameter: 180 mm
- Weight: of motor only 7,3 kg

### FCU – FES Control Unit instrument

- Standard 57 mm size
- Sunlight readable high resolution colour display
- Indicates important parameters: Temperatures, RPM, Power, Voltage, Current, Battery capacity, Remaining Time
- Warning messages together with alerting sound
- Logging of all FES parameters to SD card every second

### Propeller

- Carbon fibre foldable propeller
- Blades bended according fuselage contour
- Diameter: 1.0 m
- Automatically opens when motor starts
- Folded blades are rotated closer to the fuselage
- Automatic positioning after stop

### FES Battery packs GEN2 (with improved safety)

- High temperature resistant glass-fibre prepreg housing
- Integrated BMS (Battery Management System)
- Connectors for high power cables hidden inside of pack
- 2 battery packs needed, each weighting only 16 kg
- 14 lithium ion cells in each pack, produced by Kokam
- Capacity of single cell: 40 Ah
- Total available energy: 4,2 kWh
- Easy to take out of the fuselage to charge at home
- Stainless steel transport/storage boxes as standard equipment
- FES discharging assistant as standard equipment

### Charging

- Two 600W chargers provided with the system as standard
- Charging time: about 6 hours with two 600W chargers
- 1200W and 2000W chargers optionally available
- Charging time: about 3 hours with two 1200W chargers

## Sailplane types which can be ordered new with FES system

FES as Front Electric Self-sustainer system is currently available for next new sailplane types:

15m wingspan: **Diana 2 FES**

15-18m wingspan: **Ventus 3 FES, Discus 2c FES, HPH 304ES, LS8e-neo**

15-18-21m wingspan: **LAK17B FES**

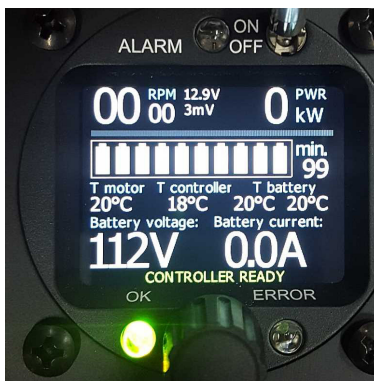
FES as Front Electric Self-launch system is currently available for next new sailplane types:

13,5m wingspan: **MiniLAK FES, SILENT 2 Electro**

15-18-21m wingspan: **LAK17C FES**

# HIGHLIGHTS

- High power electric motor, for a good climb rate
- Low noise level
- Folding propeller, with instant start and stop with automatic positioning
- Low additional weight of the complete system (approximately 45kg-50kg)
- The aerodynamics of the sailplane are not changed during motor operation
- Low aerodynamic drag under power, so only 4-5kW power is needed for horizontal flight
- No shift in the centre of gravity due to motor operation
- 12V power for instruments is generated with DC/DC converter
- Reduced operating and towing costs
- Easy removal of Battery packs for safe charging out of sailplane
- Green solution



FES system development and production by:



AVIATION PRODUCTS

LZ design d.o.o.  
Brod 3D  
SI - 1370 Logatec  
Slovenia



info@lzdesign.si  
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## IMPRESSIONS

It is not a matter of liking the FES system or not, it should simply be installed in all newly manufactured gliders. This include gliders for competition pilots.

[SURVIVING A CRASH, Sailplane & Gliding \(April/May18\)](#)

If you are a glider pilot and you haven't heard of FES, give yourself a slap! The Front Electric Sustainer (or Self-Launcher for Annex II gliders) is quite likely the most useful soaring invention since the variometer!

[FLYING THE FES, Sailplane & Gliding](#)

For me, it makes an enormous difference in the way I can now envision Soaring, and I believe it has the potential to revolutionize the way we practice soaring in the future.

[Flying the FES-equipped Silent 2 Electro, Francois Pin, Soaring Cafe](#)

»The combination of an electric motor, which always starts reliably, and an engine position with unproblematic execution of all operations, making mistakes virtually nonexistent, is an absolute plus in aviation safety.«

[Ludwig Haslbeck, Segelfliegen Magazin](#)

»The simplicity and reliability of the FES are one of the primary reasons that I purchased FES option.«

[LAKI7B FES flight impression by Renny Rozzoni, Soaring magazine](#)

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AERO Friedrichshafen, April 10 - 13, 2019; Friedrichshafen, Germany