

AIRCRAFT INFORMATION

Taurus Electro G2

&

Plug & Play Electric Propulsion System

&

Solar Trailer System



Introduction

This document is published for the purpose of providing general information about the Pipistrel Taurus Electro G2 Aircraft and associated products. Distributors/promoters and customers should familiarize themselves with this document to assist in their evaluation of the Taurus Electro G2 aircraft, the Solar Trailer and the Plug & Play electric propulsion system.

Should more information be required, please contact

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This document has been produced for the Pipistrel Taurus Electro G2 aircraft in November 2013. With the ongoing development of the aircraft Pipistrel reserves the right to revise this document whenever occasioned by product improvement, government/authority regulations or any other good cause.

IMPORTANT NOTE: Currently only be Pipistrel Taurus fitted with the Rotax 503 engine is approved in the LSA category (USA).

In most countries electric aircraft can be registered in the ultralight or experimental aircraft categories.





General Description

All information herein applies to the following products.

- Pipistrel Taurus Electro G2 aircraft
- Plug & Play electric propulsion system
- Pipistrel Solar Trailer

The Pipistrel Taurus Electro G2 aircraft is a pre-molded, composite built, two-seat, single engine, mid wing, retractable, tailwheel design, high performance and very economical Ultralight and Light Sport Aircraft.

The aircraft is available in a various configurations of instrumentation and is targeted directly to recreational flyers but the Taurus Electro G2 can also be used in flying schools looking for a fully featured aircraft at a reasonable price with exceptionally low operating costs.

Basic Information

Engine	Taurus Electro G2
engine	Pipistrel ELECTRO G2 40/30
rated power	40 kw takeoff, 30 kw continuous
propeller	fixed pitch diameter 64" (1650 mm)
Dimensions	Taurus Electro G2
wing span	49 ft 1 inch (14.97 m)
length	23 ft 11 inch (7.30 m)
height (propeller extended)	8 ft 9 inch (2.70 m)
wing surface	132 sqft (12.26 m ²)
vertical fin surface	12 sqft (1.1 m ²)
rudder surface area	4.8 sqft (0.45 m ²)
horizontal stabilizer and elevator surface	17.5 sqft (1.63 m ²)
aspect ratio	18.3
flap positions	-5°, -0°, +5°, +9°, +18°

Weights, center of gravity, Taurus Electro G2 Version

Taurus Electro G2	UL	LSA
maximum weight takeoff (varies on market)	472.5 kg	1210 lbs (550 kg)
maximum weight landing	472.5 kg	1210 lbs (550 kg)
empty aircraft weight 20 Ah battery pack (incl. parachute rescue system)	306 kg	674 lbs (306 kg)
empty aircraft weight 30 Ah battery pack (incl. parachute rescue system)	332 kg	732 lbs (332 kg)
empty aircraft weight 40 Ah battery pack (incl. parachute rescue system)	358 kg	789 lbs (358 kg)
payload with 20 Ah battery pack	166.5 kg	537 lbs (244 kg)
payload with 30 Ah battery pack	140.5 kg	480 lbs (218 kg)
payload with 40 Ah battery pack	114.5 kg	423 lbs (192 kg)
baggage allowance	10 kg	22 lbs (10 kg)
centre of gravity (MAC)	See POH	
take-off performance 20 Ah battery pack	4000 ft AGL climb	
take-off performance 30 Ah battery pack	6000 ft AGL climb	
take-off performance 40 Ah battery pack	8000 ft AGL climb	



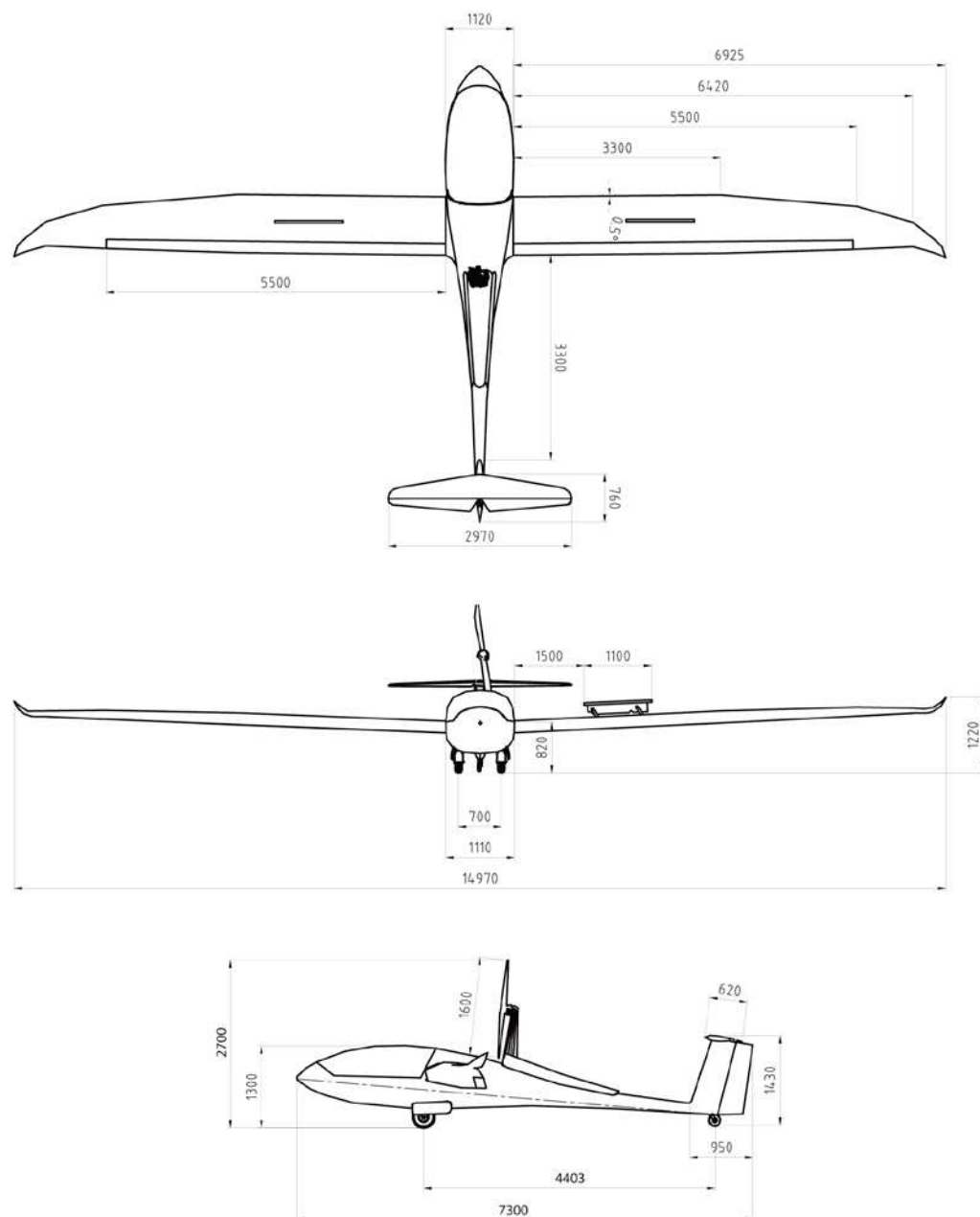
Dual battery pack behind cockpit



Dual battery pack in engine bay

3-view drawing

Showing the Pipistrel Taurus Electro G2 aircraft, dimensions are in mm.





Performance

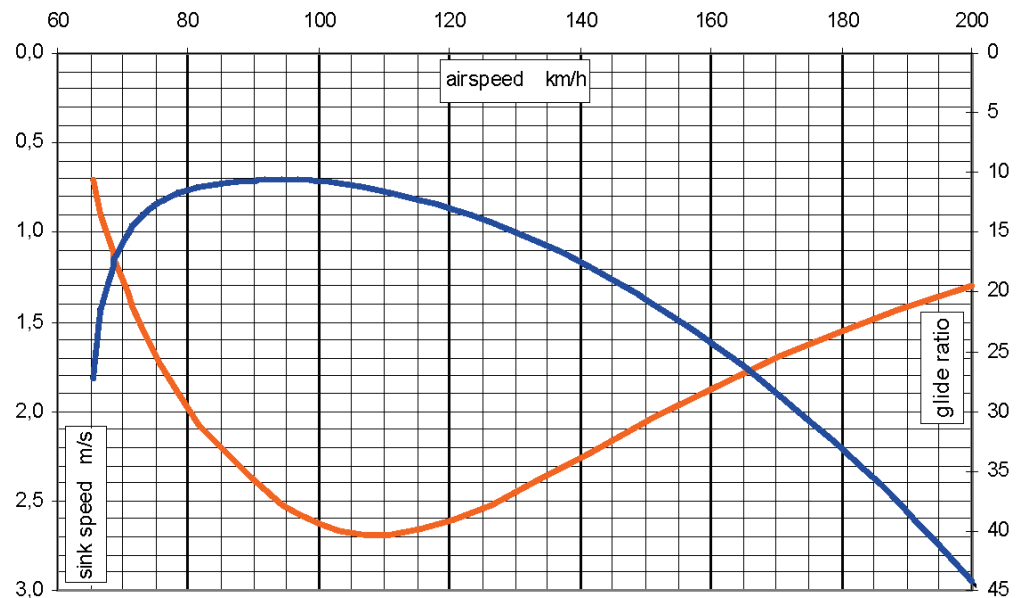
Data published here is for take-off weight of 1212 lbs (550 kg), ISA conditions at sea level.

FLIGHT CHARACTERISTICS

stall speed with flaps	34 knots (63 kmh)
stall speed clean	40 knots (74 kmh)
max horizontal speed at sea level with engine	65 knots (120 kmh)
VNE (ultralight Category)	121 knots (224 kmh)
VNE (LSA Category)	120 knots (222 kmh)
maximum speed with flaps down	70 kts (130 kmh)
maximum speed to open airbrakes	82 kts (152 kmh)
manoeuvring speed	82 knots (152 kmh)
turbulence penetration speed	82 knots (152 kmh)
best climb speed	54 knots (100 kmh)
maximum climb rate	580 fpm (2.9 m/sec)
minimum sink rate	140 fpm (0.7 m/s)
minimum sink speed	51 knots (94 kmh)
maximum sink with airbrakes	1160 fpm (5.8 m/s)
best glide ratio	41:1
best glide ratio speed	58 knots (108 kmh)
glide ratio at 75 knots	33:1
glide ratio at 97 knots	23:1
take-off distance at MTOW	530 feet (160 m)
take-off distance over 50' obstacle at MTOW	800 feet (245 m)
landing distance over 50' obstacle	885 feet (270 m)
absolute ceiling under power at MTOW	12,700 feet (3,900 m)
maximum speed in aero tow	81 knots (150 kmh)
maximum service load @ 550 kgs	+4 -2
maximum service load @ 472.5 kgs	+5.3 -2.65
designed safety factor	1.875
maximum tested load	+ 7.2g - 7.2g
45°- 45° roll time	3.8 s

Speed Polar

Speed polar in clean glider configuration (gear & engine retracted, at typical flying weight of 480 kgs)





What is New?

Pipistrel is proud to announce the Taurus Electro G2 was the first ever high-performance two-seat, side-by-side, self-launching electric aircraft to fly in the world. The MTOW was designed for 550 kg (1210 lbs) which provides for an impressive payload of more than 250 kg (550 lbs)!

Electric propulsion Overview

Are you ready for the future?..... the Taurus Electro G2 is.

Have you ever wondered what is it like to fly all electric?

Virtually silent and vibration free? With no emissions whatsoever and for a fraction of the usual cost. The Taurus Electro G2 is a fully electric-powered version of the Taurus 503 sharing the same performance numbers.

Pipistrel would like to share some important details regarding the system architecture and integration of the electric powertrain into the Taurus Electro G2 aircraft which is now in serial production. As previously mentioned, the airframe, control system, seating arrangement, ergonomics, structure, etc. are identical to the ones already certified on Taurus 503 so the following information is only on the unique electric powertrain and its components.

Following extensive testing of the Taurus Electro G2 prototype Pipistrel decided not only to refine the product for serial production, but rather to rethink, redesign and implement completely new solutions into the Taurus Electro G2 design. The result is what our Research and Development team calls the Taurus Electro G2 "Generation 2" or G2 in short. This new production version represents a great step up from the original prototype.

The propulsion motor is a new design and now weighs an impressive 11 kg rather than the original 16 kg and now generates 10 kW more power providing a total of 40 kW for take-off. Due to this 33% increase in power and 40% decrease in weight Pipistrel developed a new propeller which has proven to be more efficient than the original version flying on the Taurus Electro G2 Prototype.

This new propeller is a special design taking into account all advantages of high-torque that the electric motor can provide and we utilize the latest propeller tip shapes for further improve performance. The result is an efficient, yet very quiet composite propeller. System voltage is topped at 272 V, using the latest, custom made, Lithium Polymer 25C discharge rate cells.

The most important additions to the Taurus Electro G2's powertrain are features that pilots and owners will value and admire. Pipistrel has introduced a World's first; a full set of on-board networked avionics providing fly-by-wire



Pipistrel Taurus Electro G2 Information Pack

powertrain management with built-in multi-layer protection logic. This represents a huge improvement over the system used in the Taurus Electro G2 prototype where everything was handled by the pilot.

The first element of this networked system is the state-of-the-art hybrid Battery Management System (BMS) which was developed entirely in house to be able to function with tighter tolerances than commercially available systems, yielding better performance and longer battery life.

The CANbus battery management system (a special kind of communication network which our battery components use for information interchange) monitors the batteries, which were specially developed to be used in the Taurus Electro G2. They represent the absolute pinnacle of today's battery technology, combining low weight, high power and high energy density to levels that seemed impossible as recently as 2012. The batteries are placed in aluminum boxes with dedicated power and signal connectors. Each battery cell's performance is monitored, temperature measured and future performance predicted.

The system is able to forecast when a battery cell is under performing and signals the need for a premature replacement. All parameters are also logged in the on-board flight data recorder. The four (4) battery boxes provide protection for the user and feature safety connectors which are removable and replaceable.

The second element is the power inverter/motor controller. It's location has been moved into the aircraft's fuselage, it has become more efficient and features self-protection logic against current spikes, over temperatures and other potential abnormal situations. In other words, the controller is not only driving the motor, but also providing for the low-level protection (for example... battery warnings, over and under current protection, over and under voltage protection etc) of itself, the batteries and motor. For longer storage periods or during winter in sub-freezing temperatures the battery enclosures can be removed from the aeroplane and stored in a warm location.

The most noticeable addition to the networked system is the color-display cockpit interface instrument. The screen is really bright, in fact brighter than most displays out there, and is readable in the strongest of sunshine! The instrument indicates the drive mode and important parameters to the pilot and provides the interface for engine retraction and extension. Everything is operated via two (2) toggle switches and a rotatable knob.

The first toggle switch is the power on/off switch and does exactly that – powers up the motor controller. The second toggle switch is the motor position selector “up/down” i.e. extended or retracted. This process is now fully automated and the propeller is positioned and held in place while the motor



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extends or retracts. The pilot only selects the desired mode with the toggle switch. The rotary encoder acts as the throttle selector.

Due to the complex nature of electric propulsion systems Pipistrel decided to utilise the computational power of this cockpit interface instrument and have it running in the role of the Master On-Board Computer. This means it not only displays data to the pilot, but also “talks” to every other powertrain component on board via CAN bus and makes everything sync together. It is able to detect overheating of individual components and reduce power gradually in order to maximize the climb potential with the given system status. Not only that, it provides systems diagnostics and all necessary warnings to the pilot.

Combining all elements, we have developed an aircraft which offers more performance and an almost care-free use when compared to the Taurus Electro G2 prototype.

Great performance

The Taurus Electro G2 is equipped with an impressive 50 HP (equivalent) retractable power pack, allowing for completely unassisted powerful takeoffs even on super short runways and glider fields. Takeoff distance is less than 530 ft (160 m) at MTOW and the rate of climb settles at just under 600 fpm (3 m/s) mark. In the world of two-seat self-launching gliders, such take-off and climb performance are not common.

In the Taurus Electro G2 you will reach 3000 ft AGL (915 m) in less than 6 minutes and this is where the ESYS-MAN V2 Engine Control System takes over. The system is fully automated; making sure that the propeller has positioned itself correctly and retracts the engine for you while you concentrate on finding that perfect lift. Built-in safety even prevents inadvertent start-ups or retractions of the engine!

Great glide

As a glider, Taurus Electro G2 sports a glide ratio of 41:1 and features 5-stage flaperons to improve the performance at both low and high speeds.

Spacious large cockpit

One thing you notice immediately on the Taurus Electro G2 is the luxurious, incredibly spacious and comfortable side-by-side cockpit, specially optimized for tall pilots. Side-by-side seating arrangement makes communication between the pilots perfect, unlike conventional tandem two-seaters. Full dual controls are reachable to both pilot and passenger and the pedals, seats, headrest and ventilation can be adjusted to suit your body and needs in just seconds even during flight.

Luggage storage

For convenient storage there are side pockets for each pilot and a roomy soft sack baggage compartment behind the seat with space for an oxygen system as well. The baggage compartment is accessible during flight, a major breakthrough in gliding!

Independence

With the Taurus Electro G2 gliding really does become independent. Gone are the requirements for assistance during assembly, flying (including take-off) and disassembly, you really can go gliding whenever wish and wherever you wish!

The Taurus Electro G2 features two main landing wheels to achieve ground stability and taxing is effortless because of the steerable tail wheel.

Glowing references

Klaus Ohlmann, a World authority in gliding and holder of a multitude of World Records, owns a Taurus and confirms the great advantages over other gliders.

- the Taurus has enough space in the cockpit for two very large pilots and the luggage compartment is an excellent addition;
- side-by-side seating arrangement is a real reward in comparison to the tandem-seating. Flying the Taurus is a lot more fun;
- the ballistic total-rescue system is huge advantage when compared to conventional motorgliders;
- taxi with the double-wheel undercarriage is a real luxury, especially for training flights;
- the overall quality and finish is second to none;
- it has self-fitting connections for all flight controls - big plus;
- although being a light sport aircraft, the Taurus feels like a real glider;
- at the price of about 50% of what you would pay for another self-launching two-seat glide, Taurus will be a success story in the world of gliding!

Safety and rescue parachute

Safety is Pipistrel's primary concern; Taurus Electro G2 features the Safety Cockpit Concept. The entire cabin area is encased with energy absorbing structures made from Kevlar, an amazing material which maintains the integrity of the cabin and makes it safer in stronger impacts. Together with our special Safety Cockpit Concept the Taurus Electro G2 is also equipped with a ballistic parachute rescue system, which saves the complete aircraft together with the crew in case of severe emergencies. The parachute opens quickly and the aircraft slowly descends to the ground without the pilots leaving their

seats. Furthermore, the aircraft is not additionally damaged by use of rescue system; the cabin and pilots remain completely intact.

Handling and instrument column

Both pilots have individual control sticks and rudder pedals. The landing gear operation lever, flaps, airbrakes, wheel brakes and trim levers are positioned for easy use of both pilots and are conveniently located in the middle, between both seats. The instrument column not only fits all instruments, but also the throttle push-lever, the optional nose tow hook or winch tow hook, ventilation handle and engine retraction system interface. All handles and levers ensure sensitive, yet reliable aircraft handling.

Comfort

For added comfort pilots enjoy adjustable headrests, adjustable rudder pedals and separate vent window for each pilot and a central ventilation system for efficient de-fogging of glass surfaces. The canopy is a molded single piece Lexan with no support columns. Entering the cockpit is simple and unobstructed as is the visibility out of the cockpit in all flight stages.

Undercarriage

The Taurus Electro G2 has a taildragger undercarriage. The two main, retractable wheels are equipped with separate hydraulic brake systems for easy ground handling. The undercarriage retracting system is fully mechanical but only needs very light forces on the cockpit lever during operation. The tail wheel is not retractable but fully steerable, which makes taxiing a walk in the park.

Other systems

The airbrakes, flaperons, trim are all mechanical and identical to the ones used in other Pipistrel models.

The Taurus Electro G2 can also take-off being towed behind a tow-plane with the optional tow-hook with quick disconnection mechanism on board. It is also possible to order a winch launch hook on the belly of the Taurus Electro G2.

Leather interior

People often ask – is the leather upholstery offered as optional equipment truly leather? Yes, we use 100% genuine NAPA leather with Bovine texture in a wide choice of colors which are published on our website (see Gallery). The customer can choose the color of the seats and surrounding upholstery in a single color.

Solar Panels

Solar panels are included with the Taurus Electro as standard; they cover all electrical consumption during gliding. They will recharge the avionics battery on ground as well.

Exterior paint

The paint used on the Taurus Electro G2 is a special acrylic based pigment, which is applied to the molds during the manufacturing process. Pipistrel aeroplanes are not after-painted like many other aeroplanes – instead, paint is applied onto/into the structure while molding. This makes the paint much more durable and resistant to UV light and environmental contaminants. Recommendations for care and cleaning of the aircraft can be found in the Flight manual and Maintenance manual, section Handling and Maintenance, chapter. Keeping your aircraft in perfect shape.

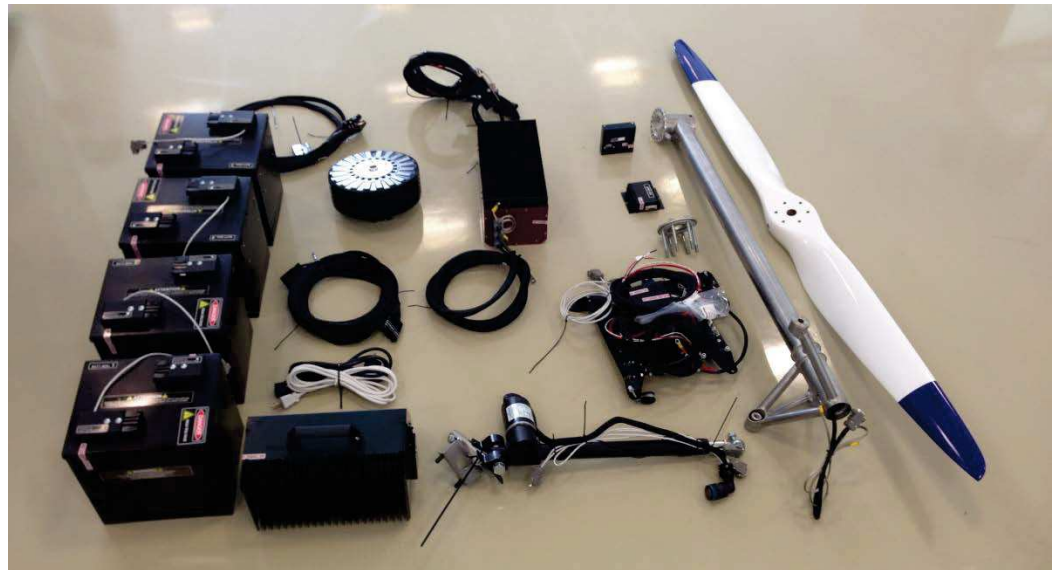
What is the Pipistrel Taurus Electro G2 warranty?

A full copy of the warranty conditions is available from Pipistrel on request. The airframe and propulsion system is covered by Pipistrel and individual warranties are carried by the instrument and avionics manufacturers.

Plug & Play electric propulsion system

The exact same propulsion system used in the Taurus Electro G2 is available to government and other manufacturers. Everything you need for your electric aeroplane or self-launching glider is included in one package

- Batteries in different configurations, complete with BMS, built in protection
- Dedicated Lightweight Airborne Charger with smart logic
- 40 kW (takeoff) high-efficiency electric motor
- High-efficiency power controller/inverter. Controller voltage 185 V – 300 V
- Communication & Cockpit Voltage Module
- Cockpit instrument/manager ESYS-MAN V2
- Advanced CANbus communication between units
- Datalogging
- Optimized composite propeller, diameter 165 cm, efficiency is around 85% at maximum RPM in climb regime (50 KIAS), maximum static thrust 143 kg in ISA conditions which is desired for climbs



Special features

Pipistrel's Electric propulsion system is a true plug & play solution for electric aircraft. You receive everything you need: the motor, power controller, battery system complete with BMS and a lightweight airborne charger, complete with an advanced color display cockpit instrument, which provides you with full control. The system also supports propeller positioning and automatic retraction for self-launching glider applications!

ESYS-MAN V2 – the cockpit instrument

High-resolution 3 inch sunlight readable color display and control interface. Displays all system temperatures, controls RPM/Power with automatic over-temperature protection, charge indicator, charge status overview, battery health overview, visual warnings, system enable/disable, support for propeller positioning and automatic retraction (self-launch gliders).



Charger

Pipistrel offers 2 chargers, a portable 2 kW, world unit, supporting both 110V/60 HZ and 250 V/50 Hz networks. It has a 5 inch display and an intuitive interface, providing information about charge status, battery health overview and system configuration. It supplies 2 kW charge power in a 3 kg package. For faster charging we have an 8kW charger weighing just 25 kg.



Pipistrel Standard 2kW charger



Pipistrel Optional 8kW charger

Cockpit battery

The cockpit battery, which supports the avionics, power controller and motor extension/retraction, is charged together with the main power battery. This provides an extra layer of safety and allows gliding even with the main battery depleted. The cockpit battery is also charged in flight by the solar panels attached to the aircraft

CANbus

A special kind of communication network which all components use for information interchange. The level of safety and functionality is greatly improved!

Propeller

Composite lightweight 2-blade propeller, diameter 165 cm, specially optimized specially to take advantage of the electric motor characteristics. Classic propeller designs do not come even close!

Plug & Play electric propulsion system technical specifications

Battery capacity 20 Ah	4.75 kWh
Battery capacity 30 Ah	7.10 kWh
Battery capacity 40 Ah	9.7 kWh
Battery Management System (BMS)	Integrated, high accuracy with datalogging and battery failure prediction.
Airborne Charger	Supports all voltages 110 VAC and 240 VAC, 2 kW, typical charge time 3 h
Battery voltage	190 V -270 V Voltage per battery pack: nominal 17x3.7 V = 63 V
Maximum operating temperature	70° C – max battery temperature 60° C
Minimum operating temperature	5° C
Electric motor power	High efficiency outrunner, synchronous 3-phase PEM 40 kW (1 min), 30 kW cont. Air cooled
Max RPM	2200 RPM
System weights	20 Ah unit = 59 kg 30 Ah unit = 75 kg 40 Ah unit = 91 kg

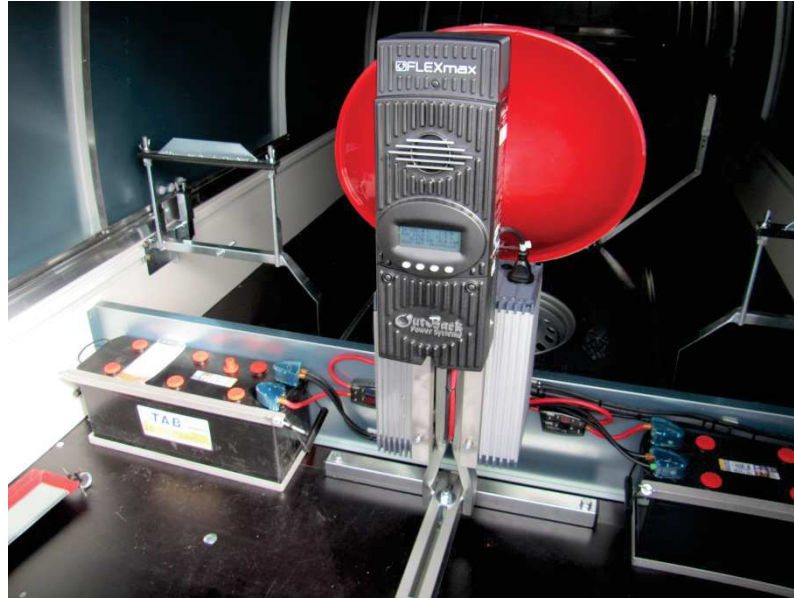
Solar Trailer

Do you wish to fly for absolutely free? It is possible!

Pipistrel is presenting another World's first – the concept of Flying For Free. Pipistrel developed the Solar Trailer®, which can charge-up the Taurus Electro G2 in as little as 5 hours absolutely free of charge and with zero emissions!



Furthermore, when the Taurus Electro G2 is stored in the trailer during a week of bad weather, it will still be charged and ready to fly by the weekend. The Solar Trailer and Taurus Electro G2 are perfect companions and demonstrate how it is possible to fly free of charge, quietly and with absolutely zero emissions, with today's technology!



The solar trailer offers both a 12 V connection (to charge your aux. instruments, etc) and 110V/220V connections at the front and back of the trailer, where you connect the Taurus Electro G2's charger.



The solar-system by-pass allows charging the aircraft inside the trailer when parked in the hangar/garage for example.



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The Solar Trailer gathers energy when you are flying by charging the buffer battery in the trailer which has a 3 kWh capacity. When you return from flying the buffer batteries energy can be transferred directly into the Taurus Electro G2. This way you can charge the Taurus Electro G2 during the night with the energy that has been stored during the day!

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