PIPISTREL

AIRCRAFT INFORMATION

Taurus Electro G2.5 2019

&

Plug & Play Electric Propulsion System

&

Solar Trailer System

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

Introduction

This document is published for the purpose of providing general information about the Pipistrel Taurus Electro G2.5 Aircraft and associated products. Distributors/promoters and customers should familiarize themselves with this document to assist in their evaluation of the Taurus Electro G2.5 aircraft, the Solar Trailer and, the Plug & Play electric propulsion system.

Should more information be required, please contact

Pipistrel d.o.o.
Goriska cesta 50a
SI-5270 Ajdovscina
Slovenia, EU.

www.pipistrel-aircraft.com
or
www.pipistrel-usa.com

This document has been updated for the Pipistrel Taurus Electro G2.5 2019 model aircraft in APRIL 2019 (generation 2.5 is a mid-model revision featuring updated battery systems). With ongoing development of the aircraft Pipistrel reserves the right to revise this document and features of the aircraft whenever occasioned by product improvement, government/authority regulations or any other cause.

In most countries, this electric aircraft can be registered in the LSA category as a glider, or airplane, or ultralight, or experimental aircraft. Rules vary and change between registration locations so please check with your local dealer for your local requirements.

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

General Description

All information herein applies to the following products.

- Pipistrel Taurus Electro G2.5 aircraft. 2019 update.
- Plug & Play electric propulsion system
- Pipistrel Solar Trailer

The Pipistrel Taurus Electro G2.5 aircraft is a composite built, two-seat, single engine, mid wing, retractable, tailwheel design, high performance and very economical Ultralight and Light Sport Aircraft model.

The aircraft is available in a various configurations of instrumentation and is targeted directly to recreational flyers. The Taurus Electro G2.5 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 G2.5**
engine	Pipistrel ELECTRO G2.5 40/30
rated power	40 kw takeoff, 30 kw continuous
propeller	fixed pitch diameter 64'' (1650 mm)
Dimensions	**Taurus Electro G2.5**
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 °

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

Weights, center of gravity, Taurus Electro G2.5 Version

Taurus Electro G2.5	UL	LSA
maximum weight takeoff (varies on market)	472.5 kg	1210 lbs (550 kg)
UL Market without parachute 450 kg, with parachute 472.5 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	

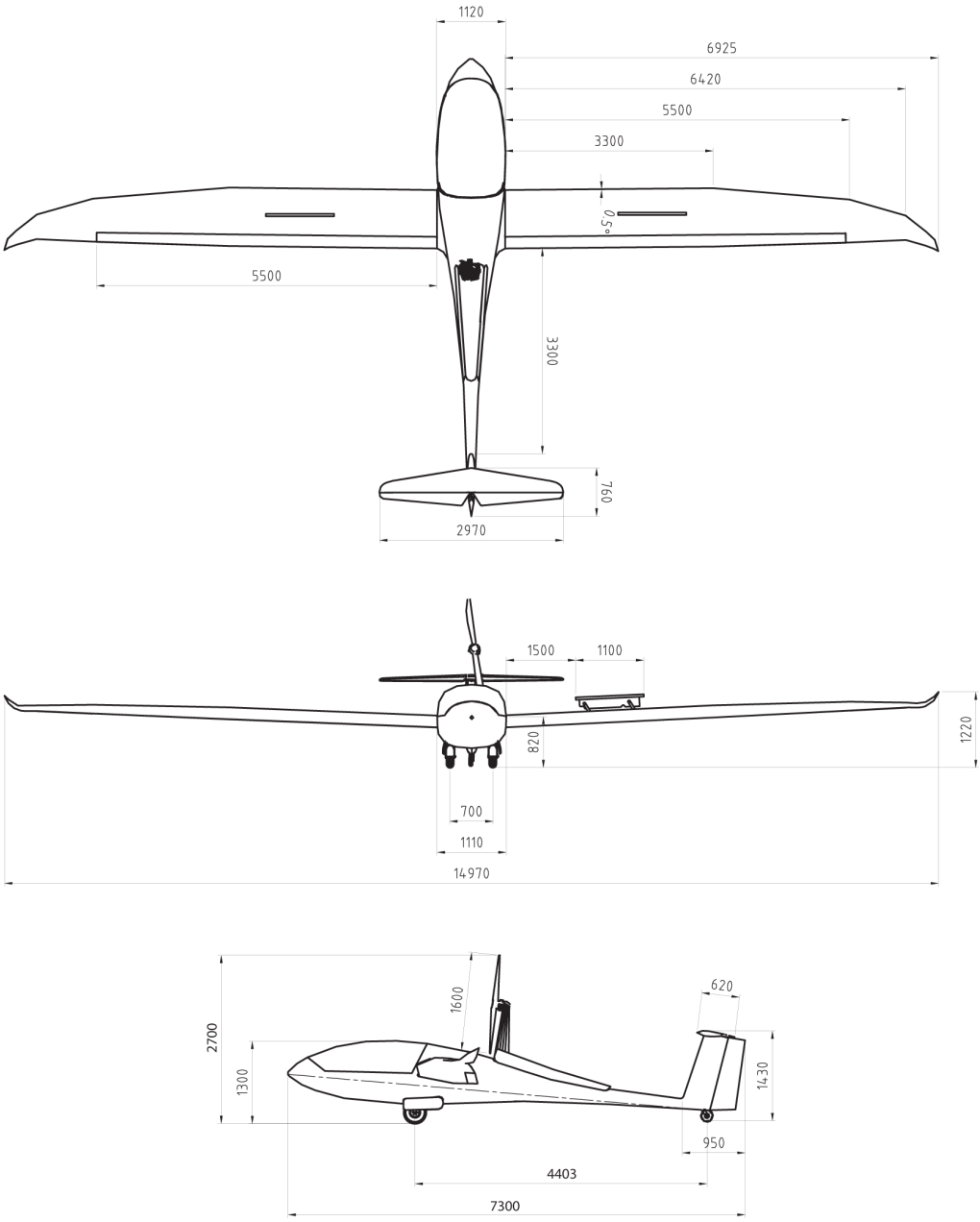
Dual battery pack behind cockpit

Dual battery pack in engine bay

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

3-view drawing

Showing the Pipistrel Taurus Electro G2.5 aircraft, dimensions are in mm.



© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

Performance

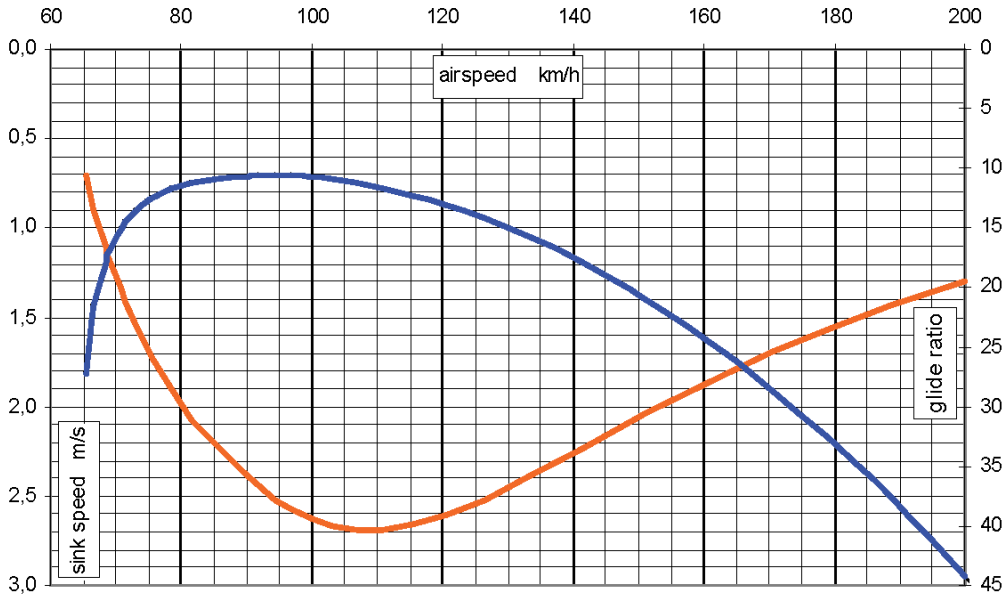
Data published here is for take-off weight of 1212 lbs (550 kg), ISA conditions at sea level.

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 (140 kmh)	33:1
glide ratio at 97 knots (180 kmh)	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 (40 Ah battery pack flown at 550 kg)	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

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

Speed Polar

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



© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

What is New?

Pipistrel is proud to announce the Taurus Electro 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)!

The Pipistrel Taurus Electro underwent an upgrade in late 2017 and again in 2019 to the generation 2.5 model and continuous improvements are a normal part of product development.

Latest upgrade included ventilating the battery packs so the aircraft could be flown in much hotter temperatures without any issues with overheating.

Full datalogging was implemented so that every aspect of the aircraft's charging, operation, storage and performance can be monitored.

New advanced battery charging principles were introduced as a flow on from the Pipistrel ALPHA Electro development. These new charging principles give a longer battery cycle life.

Software updates can now be enabled via the USB port rather than needing a can-bus dongle, this makes transfer of data and upgrades to the aircraft much easier.

Electric propulsion Overview

Are you ready for the future?..... the Taurus Electro G2.5 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 flying cost. The Taurus Electro G2.5 is a fully electric-powered version of the original Taurus 503 gas powered model and meets or exceeds the same performance numbers as the previous gas-powered model.

Pipistrel would like to share some important details regarding the system architecture and integration of the electric powertrain into the Taurus Electro G2.5 aircraft.

As mentioned, the airframe, control system, seating arrangement, ergonomics, structure, etc. are identical to the already certified, Taurus 503 model, so the following information is only focusing on the unique electric powertrain and its components.

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

Following extensive testing of the Taurus Electro 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 G2.5 design. The result is what our Research and Development team calls the Taurus Electro G2.5 “Generation 2.5” or G2.5 in short. This new production version represents a great step-up from the original prototype flown in 2007.

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. This 33% increase in power and 40% decrease in weight triggered Pipistrel to develop a new propeller.

This new propeller is a special design considering all advantages of high-torque that the electric motor can provide, and we utilize the latest propeller tip shapes for further improve performance and reduce noise. The result is an efficient, yet very quiet, composite propeller.

The most important additions to the Taurus Electro G2.5'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 powertrain management with built-in multi-layer protection logic. This represents a huge improvement over the system used in the Taurus Electro 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 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. These new batteries were specially developed to be used in the Taurus Electro G2.5. 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 fitted into aluminum boxes with dedicated power and signal connectors. Each individual battery cell's performance is monitored, temperature measured and future performance predicted.

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

The second element is the power inverter/motor controller. It's location has been moved into the aircraft's fuselage and in the process has become more

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

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 both the batteries and motor.

For longer storage periods or during winter in sub-freezing temperatures the batteries 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 ESYS-MAN V2 Engine Control System. The screen is bright and readable in the strongest sunshine! This instrument indicates the drive mode and other important parameters to the pilot and provides the interface for engine retraction and extension. Everything is operated via two (2) toggle switches and a rotating 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 extends or retracts. The pilot only needs to select the desired mode with the toggle switch and the system handles everything else. The rotary knob acts as the throttle.

Due to the complex nature of electric propulsion systems Pipistrel decided to utilize 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, Pipistrel has developed an aircraft which offers more performance and an almost care-free use when compared to the original Taurus Electro prototype.

Great performance

The Taurus Electro G2.5 is equipped with an impressive 50 HP (equivalent) retractable power pack, allowing for completely unassisted powerful take-offs 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.

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

In the Taurus Electro G2.5 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; flick the toggle switch to retract and the system makes sure that the propeller has positioned itself correctly and retracts the motor for you while you concentrate on finding that perfect lift. Built-in safety even prevents inadvertent start-ups or retractions of the motor without command

Great glide

As a glider the Taurus Electro G2.5 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 G2.5 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 pilot and passenger effortless, 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 in-flight to suit your needs in just seconds, even during flight.

Luggage storage

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

Independence

With the Taurus Electro G2.5 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 you wish and wherever you wish!

The Taurus Electro G2.5 features two main landing wheels to achieve ground stability and taxying is effortless because of the steerable tail wheel which can turn the aircraft tightly on the ground. The low center of gravity means it almost impossible to touch a wingtip when taxying.

Glowing references

Klaus Ohlmann, a World authority in gliding and holder of a multitude of World Records, was one of the first Taurus owners 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;

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

- 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 where there is never a requirement for an extra person to hold a wingtip;
- 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 glider the Taurus will be a success story in the world of gliding!

Safety and rescue parachute

Safety is Pipistrel's primary concern; the Taurus Electro G2.5 features the Safety Cockpit Concept. The sensitive cabin areas are encased with energy absorbing structures made from materials which maintain the integrity of the cabin making it safer in stronger impacts. Together with our special Safety Cockpit Concept the Taurus Electro G2.5 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 pilot and passenger have individual control sticks and rudder pedals. The landing gear operation lever, flaps, airbrakes, wheel brakes and trim levers are positioned for easy use from either seat and are conveniently located in the middle, between both seats. The instrument column not only fits all instruments, but also the throttle and ESYS-MAN V2 Engine Control System, ventilation handle, engine retraction system interface and the optional nose tow hook or winch tow hook. 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.

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

Undercarriage

The Taurus Electro G2.5 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 is fully steerable, this 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 G2.5 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 G2.5.

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. The customer can choose the color of the seats and surrounding upholstery in a single color.

Solar Panel

A solar panel is included with the Taurus Electro as standard. The solar panel will cover instrument electrical consumption during gliding. The solar panel will also recharge the avionics battery on ground.

What is the Pipistrel Taurus Electro G2.5 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.

How far can I fly on just motor power?

Flying in a straight-line horizontal flight. Take-off to 1000 ft, + 65 minutes at 55 KTS cruise + landing = approx. 55 NM.

Saw-tooth mode: is best to perform 1 climb to 3500 ft and glide to 1000 ft, another climb to 3500 ft, glide to 1000 ft, another climb to 3500 ft and glide it out. You get: 5 NM in first climb and 2 x 3 NM in second/third flight, and 15 miles for every glide + landing. 5 + 2 x 3 + 3 x 15 = 56 NM

The distance is about same no matter what you do, however the saw-tooth mode is easier to in turbulent weather.

Both are assuming full battery (95%) to 20% remaining charge.

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

How much power is needed for level flight?

7.8 kW is needed to maintain level flight at 55 knots with a dry wing, and 9 kW with when wet or with bugs on wing. Motor RPM varies with altitude, typically approx. 1600-1800 RPM between sea level and 3000 ft.

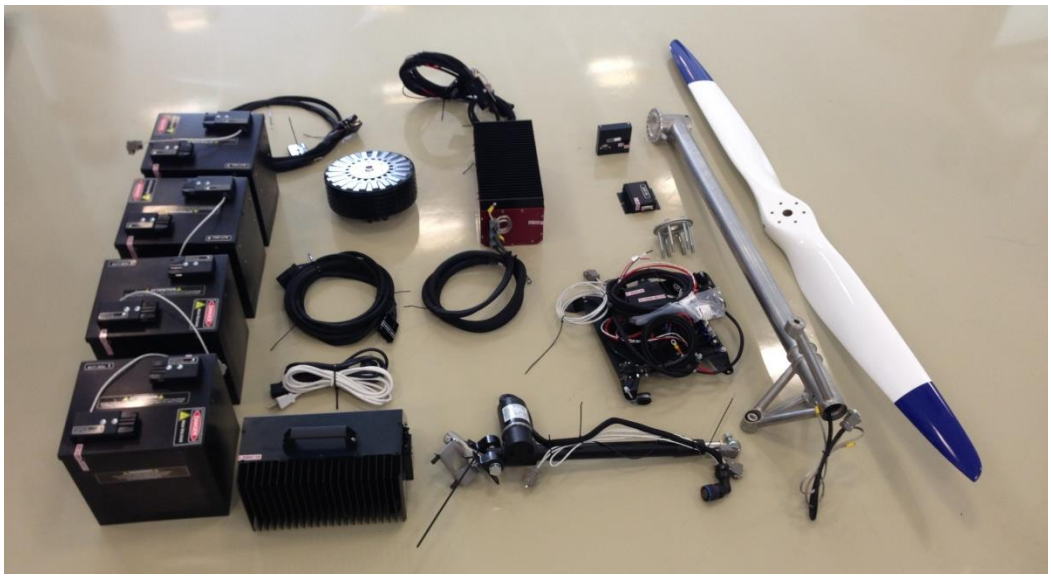
RPM does not really matter for endurance, it's only the power that is commanded that reduces battery flight endurance.

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

Plug & Play electric propulsion system

The exact same propulsion system used in the Taurus Electro G2.5 is available to government, military and other aircraft manufacturers. Everything you need for your electric aeroplane or self-launching glider is included in one package

- Ventilated Batteries in different sizes, complete with BMS, built in protection
- Dedicated Lightweight Airborne controller 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
- Full 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!

Need something different? No problems, we can develop a proprietary system to suit your needs and requirements.

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

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).

Chargers

Pipistrel offers several 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 and for faster charging we have much larger systems available.

Pipistrel Standard 2kW charger

Pipistrel Optional 8kW charger

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

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 flexible solar panel 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

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com

Solar Trailer

Do you wish to fly for free? Well, now it's 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 G2.5 in as little as 5 hours absolutely free of charge, and with zero emissions!

Furthermore, when the Taurus Electro G2.5 is stored in the trailer during a week of bad weather, it will still be fully charged and ready to fly by the weekend. The Solar Trailer and Taurus Electro G2.5 are perfect companions and demonstrate how it is possible to fly for free, quietly and with absolutely zero emissions, using today's leading technology!

The solar trailer offers both a 12 V connection (to charge your aux. instruments, etc) and 110V/220V connections inside the trailer where you connect the Taurus Electro G2.5's charger.

© APRIL 2019, Revision 2

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

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 G2.5.

This way you can charge the Taurus Electro G2.5 during the night with the energy that has been stored in the trailer batteries during the day!

| End of Document |

© APRIL 2019, Revision 2 | www.pipistrel-usa.com | info@pipistrel-usa.com