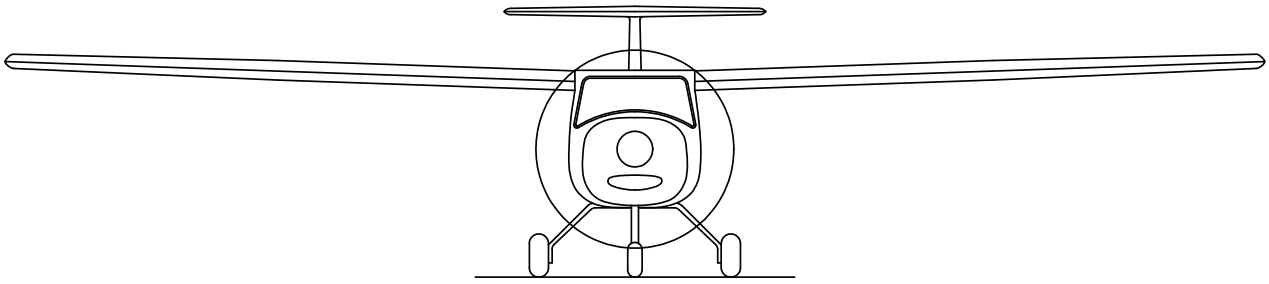
Pilot's Operating Handbook

applies to all ALPHA Electro aircraft
equipped with 60 kW electric motor



REV A00.

(12th July, 2017)

SERIAL NUMBER _____

REGISTRATION NUMBER _____

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Performance - Specifications

ALPHA Electro	60 kW Electric
Stall speed (flaps extended)	35 kts (64 km/h)
Stall speed (flaps retracted)	43 kts (74 km/h)
Typical cruise speed	85 kts (157 km/h)
VNE	135 kts (250 km/h)
Standard endurance, traffic patterns	55 min + 30 min. reserve
Standard range at cruise 85 kts	65 NM (120 km)
Takeoff - ground roll - at MTOM	459 ft (140 m)
Takeoff total distance over 50 ft obst. at MTOM	738 ft (225 m)
Landing distance over 50 ft obst.	1510 ft (460 m)
Absolute ceiling at MTOM	12,800 ft (3900 m)

NOTE **The above performance figures are based on an airplane weight of 1215 lbs (550 kg), standard atmospheric conditions, level hard-surfaced dry runways and no wind. They are calculated values derived from flight tests conducted by Pipistrel d.o.o. Ajdovščina, under the supervision of the Slovenian CAA and under carefully documented conditions. Figures may vary based on numerous factors (surface condition, temperature, water on wing, etc).**

ALPHA Electro	60 kW Electric
Maximum weight takeoff	1215 lbs (550 kg)
Maximum weight landing	1215lbs (550 kg)
Empty aircraft weight (incl. PRS)	552 lbs (251 kg)
Battery capacity, total	21.0 kWh
Battery capacity, useful	20.0 kWh
Motor	60 kW E-Motor
Propeller	three blade, fixed pitch propeller (wooden or composite), diameter 1640 mm

Coverage

The Pilot's Operating Handbook (POH), found in the airplane at the time of delivery from Pipistrel d.o.o. Ajdovščina, contains information applicable to the ALPHA Electro airplane and to the airframe designated by the serial number and registration number shown on the title page. All information is based on data available at the time of publication.

This POH consists of ten sections that cover all operational aspects of a standardly equipped airplane. Section 10 contains the supplements which provide amended operating procedures, performance data and other necessary information for those airplanes that conduct special operations and/or are equipped with both standard and optional equipment. Additional supplements are individual documents which are issued/revised separately. The log of effective pages should be used to determine the status of each supplement.

Revision tracking, filing and identifying

Pages to be removed or replaced in the Pilot's Operating Handbook are determined by the log of effective pages located in this section. This log contains the page number and revision number for each page within the POH. As revisions to the POH occur, the revision number on the effected pages is updated. When two pages display the same page number, the page with the latest revision shall be used in the POH. The revision number on the log of effective pages shall also coincide with the revision number of the page in question. As an alternative to removing and/or replacing individual pages, the owner can also print out a whole new manual in its current form, which is always available from www.pipistrel.eu.

Revised material is marked with a vertical double-bar that will extend the full length of deleted, new, or revised text added to new or previously existing pages. This marker will be located adjacent to the applicable text in the marking on the outer side of the page. The same system applies when the header, figure, or any other element inside this POH is revised. A list of revisions is located at the beginning of the log of effective pages. Pipistrel is not responsible for technical changes/updates to OEM manuals supplied with the aircraft (eg. radio, transponder, GPS, etc.).

Warnings, cautions and notes

Safety definitions used in the manual:

WARNING! Disregarding the following instructions leads to severe deterioration of flight safety and hazardous situations, including such resulting in injury and loss of life.

CAUTION! Disregarding the following instructions leads to serious deterioration of flight safety.

NOTE An operating procedure, technique, etc., which is considered essential to emphasize.

Online updates, service notice tracking

For updates and information related to service/airworthiness, please go to www.pipistrel.eu and log in with:

Username: owner1
Password: ab2008

Index of revisions

The table below shows the revision history of this POH. Check your registration authority's or the manufacturer's website occasionally for the most up-to-date releases of operation-relevant documentation, which includes this POH.

Designation	Reason for Revision	Release date	Affected pages	Issuer
REV A00	Initial issue	11th July, 2017	All	SLO.DOA.002

Log of Effective Pages

Use the table below to determine the currency and applicability of your POH. Pages affected by the current revision are marked in bold text in the page number column.

Page number	Page status	Rev. number	Page number	Page status	Rev. number
Cover	Original	0	3-5	Original	0
i-1	Blank Page	-	3-6	Original	0
i-2	Original	0	3-7	Original	0
i-3	Original	0	3-8	Original	0
i-4	Original	0	3-9	Original	0
i-5	Original	0	3-10	Original	0
i-6	Original	0	3-11	Original	0
i-7	Blank Page	-	3-12	Blank Page	-
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3-4	Original	0	7-8	Original	0

CAUTION!

This manual is valid only if it contains all of the original and revised pages listed above.

Each page to be revised must be removed, shredded and later replaced with the new, revised page in the exact same place in the manual.

Log of Effective Pages (continued)

Page number	Page Status	Rev. number	Page number	Page Status	Rev. number
7-9	Original	0	9-5	Original	0
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9-4	Original	0			

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Table of contents

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1 General

Introduction

This manual contains all the information needed for appropriate and safe use of ALPHA Electro .

IT IS MANDATORY TO CAREFULLY STUDY THIS MANUAL BEFORE USING THE AIRCRAFT.

Pipistrel d.o.o. Ajdovščina is not responsible for any damage or injury resulting from not following the instructions contained in this manual.

Technical brief

DIMENSIONS	ALPHA Electro
Wing span	34' 6" (10.5 m)
Length	21' 4" (6.5 m)
Height	6" 9' (2.05 m)
Wing surface	102 sqft (9.51 m^2)
Vertical fin surface	11.8 sqft (1.1 m^2)
Horizontal stabilizer and elevator surface	11.6 sqft (1.08 m^2)
Aspect ratio	11.8
Positive flap deflection (down)	15 °, 25 °
Center of gravity (MAC)	20% - 38%

3-view drawing

Motor/controller, battery system

WARNING! The motor is not certified for aviation use, therefore, there is no assurance it won't fail during operation at any given moment, without prior notice.

Motor

TEMPERATURE °C	PEM 60MVLC
Maximum takeoff power (1 min)	60 kW
Maximum continuous power	50 kW
Maximum operating temperature	90° C
Maximum ambient temperature	40° C
RPM	**PEM 60MVLC**
Maximum allowable rpm	2500
Takeoff RPM (typical)	2400
Climb RPM (typical)	2250

Controller

POWER CONTROLLER	H300A
Nominal power	60 kW
Maximum operating temperature	65° C
Maximum ambient temperature	40° C

WARNING! DO NOT, UNDER ANY CIRCUMSTANCES, ATTEMPT TO USE ANY OTHER BATTERIES OTHER THAN PIPISTREL FACTORY-SUPPLIED BATTERIES. ONLY USE THEM WITH THE MOTOR AND CONTROLLER MENTIONED IN THIS POH.

Battery system

Battery system	PB345V105E-A
Maximum voltage	398 V
Minimum voltage	288 V
Recommended voltage range for storage	355 V - 365 V
Maximum operating temperature	55° C
Minimum operating temperature	5° C
Allowable temperature range for storage	10°C - 40° C
Minimum charging temperature	0° C

CAUTION! TEMPERATURES BELOW 10°C WILL CAUSE A DECREASE IN BATTERY CAPACITY. PLAN YOUR FLIGHT ACCORDINGLY.

WARNING! DO NOT, UNDER ANY CIRCUMSTANCES, ATTEMPT TO CHARGE THE BATTERIES WITH ANY THIRD PARTY CHARGERS. ONLY PIPISTREL ORIGINAL EQUIPMENT MUST BE USED.

WARNING! RESPECT OPERATING AND STORAGE TEMPERATURE LIMITS AT ALL TIMES. FAILURE TO DO SO MAY RESULT IN BATTERY DAMAGE.

Propeller

ALPHA Electro	FP03-60E
three blade, fixed pitch propeller (wooden or composite)	1640 mm

Motor instrument markings

Instrument	Red line (minimum)	Yellow arc (caution)	Green arc (normal)	Yellow arc (caution)	Red line (maximum)
Tachometer (RPM)	/	/	0-2399	2400-2499	2500
Motor temp. (°C)	/	/	-20 - 89	90-94	95
Controller temp. (°C)	/	/	-20 - 59	60-64	65
Battery sys. temp. (°C)	5	6-10	11-49	50-54	55

Weight limits

Basic model weights

WEIGHT	ELECTRO
Empty aircraft weight (incl. PRS), std. battery system	379 kg
Max. takeoff weight (MTOW/MTOM)	550 kg
Minimum combined cockpit crew weight (depends on C.G. of empty aircraft)	see p. 55
Maximum combined cockpit crew weight (depends on C.G. of empty aircraft)	see p. 55

WARNING! SHOULD ONE OF THE ABOVE-LISTED VALUES BE EXCEEDED, OTHERS MUST BE REDUCED IN ORDER TO KEEP THE MTOM BELOW 550 KG. FAILING TO COMPLY WITH ANY OF THE WEIGHT LIMITATIONS MAY CAUSE UNCONTROLLED GROUND HANDLING AND/OR FLIGHT DUE TO EXTREME CENTER OF GRAVITY POSITION.

Center of gravity range

- The aircraft's safe center of gravity position ranges between 20% and 38% of mean aerodynamic chord.
- The center of gravity point ranges between 7.7'' (195 mm) and 14.5'' (368 mm) aft of the datum. The datum is the wing's leading edge at the fuselage root.

G-load factors

Max. positive wing load: + 4 G

Max. negative wing load: – 2 G

All parts have been tested to a safety factor of a minimum 1.875, meaning they were subjected to at least a load of 7.5 G

2 Aircraft and systems

Introduction

The ALPHA Electro is a 34' 6" (10.5 m) wingspan, two-seat T-tail high-wing motorplane made almost entirely of composite materials.

It has a robust, tricycle undercarriage that incorporates brake-equipped wheels, a U-shaped composite strut and a steerable nose wheel.

The ALPHA Electro features flaperons, meaning that one movable surface on each wing acts both as the flap and the aileron. Flaps offer 3 settings: retracted 0°, +15° and + 25°.

Full dual main flight control levers make the ALPHA Electro ideal for initial and advanced flight training. All aileron, elevator and flap controls are connected to the cabin controls using self-fitting push-pull tubes. The rudder is controlled via cables. The elevator trim is a mechanical, spring type mechanism.

All aircraft ship with H type safety belts attached to the fuselage at three mounting points. The rudder pedals can be adjusted before and also in-flight to suit your size and needs.

The aircraft is equipped with two battery boxes: one is located aft of the cabin bulkhead and the other is aft of the firewall. The battery system is ventilated and thermally protected.

The electric motor is a 60 kW peak power unit capable of energy recuperation during descent.

The windshield, doors and top window are made of 2 mm anti-UV tinted Lexan, which was specially developed not to shatter or split on impact.

The main wheel brakes are hydraulically driven disc type and activated via a cockpit hand-lever. The hydraulic brake fluid used is DOT 3 or DOT 4.

Cabin ventilation is achieved through special vents fitted into the doors

The propeller is a fixed pitch three-blade design.

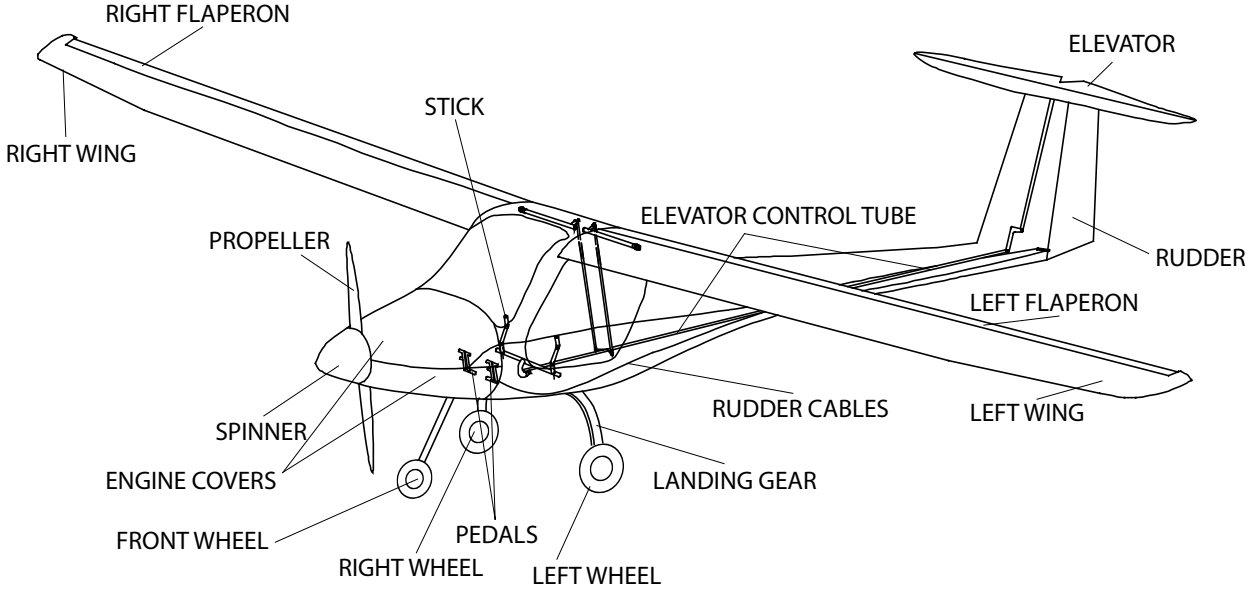
The resettable electric circuit breakers enable the pilot to test individual circuit items and disconnect the batteries from the circuit if required.

Navigational (NAV) lights, anti collision (AC) lights and a landing (LDG) light are installed.

The firewall is reinforced with heat and noise insulation.

Basic instruments come installed with operational limits pre-designated.

A PRS is present and located in aft fuselage.



Composite parts are made of:

Fabric:	GG160, GG200, GG300, 90070, 92120, 91125, 92140, 92145, KHW200
Roving:	NF24
Foam:	55kg/m3, 75 kg/m3 PVC 3mm, PVC 5 mm, PVC 8mm
GFK:	3 mm, 5 mm, 7 mm of thickness
Paint:	acrylic paint
Firewall	glass-aluminium sandwich

Metal parts used are:

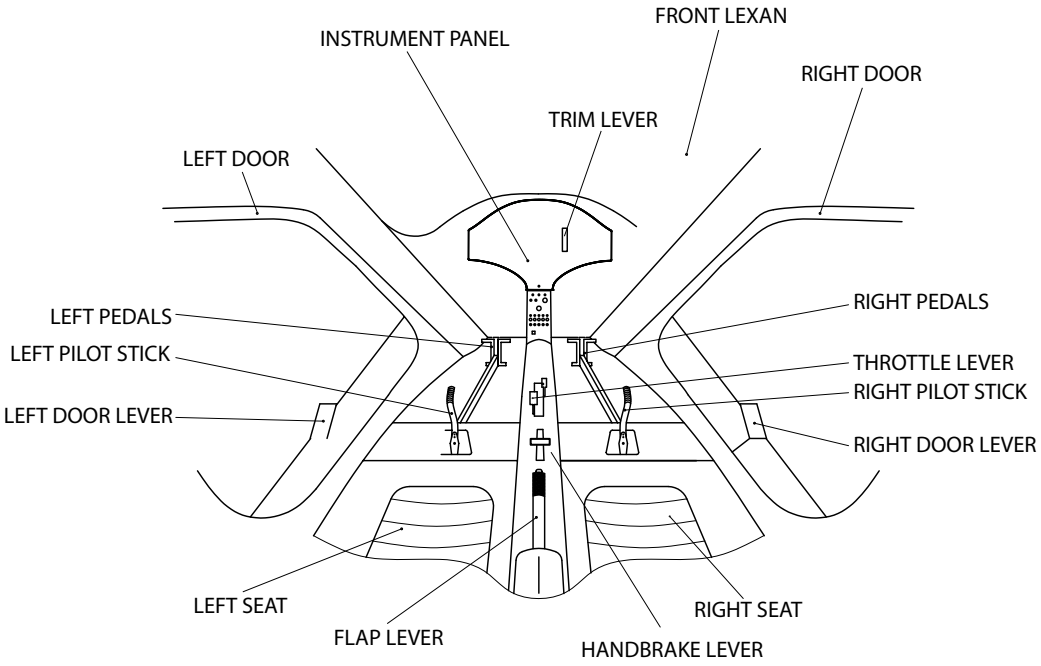
Tubes:	materials: Fe0146, Fe 0147, Fe0545, Fe1430, AC 100, CR41 and LN9369
Sheet metal:	materials: Fe0147 and Al 3571
Rods:	materials: Fe 1221, Fe 4732, Č4130, Al 6082, CR41 in Al 6362
Cable:	AISI 316
Bolts and nuts:	8.8 steel

All composite parts are made of glass, carbon and kevlar fiber manufactured by Interglas GmbH and Sigratex carbon.

All parts have been tested at safety factor of a minimum 1.875.
All composite parts are made in moulds, therefore no shape or structural differences can occur.
All parts and materials used in the ALPHA Electro are also used in the glider and general aviation industry and thus comply with aviation standards.

Cockpit controls

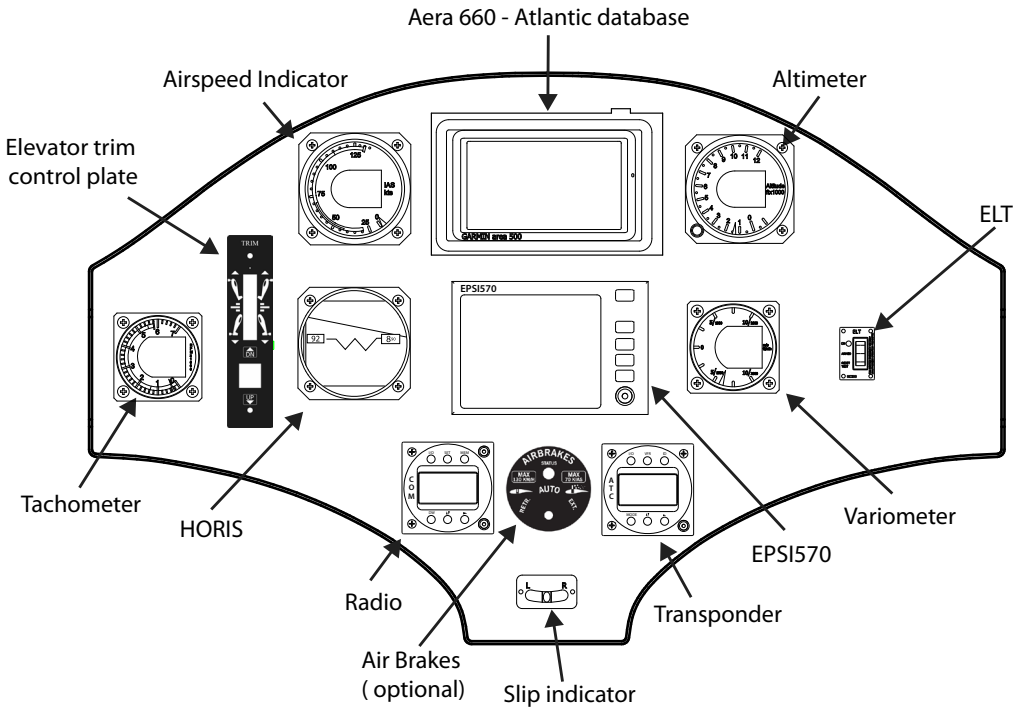
The ALPHA Electro cockpit levers are divided into two groups:



Individual control levers: pilot stick and rudder pedals

Dual control levers: throttle lever, handbrake lever, flap lever, trim lever, door handles and emergency parachute release handle.

Instrument panel **(Note: European configuration depicted below)**



The instrument panel is equipped with various instruments/gauges that indicate airspeed, altitude, RPM, etc.. Depending on whether the aircraft has a US or NON-US instrument configuration, options include: artificial horizon, EPSI 570 electric system parameters (monitors RPM, inverter temperature, motor temperature, coolant temperature, state of charge, battery temperature and state of health), radio Filser ATR833 or Garmin GTR200, transponder Filser TRT800A or Garmin GTX335 and the GPS Garmin AERA 660. Instructions on how to use the instruments/gauges (COM, GPS) are found in individual equipment manuals, which are to be considered supplement to this POH. The gauges are round and 80 mm or 57 mm in diameter, while the GPS has a touchscreen. The radio is a modern lightweight unit, features full VOX intercom and dual PTT connections.

Cockpit electrical system panel:

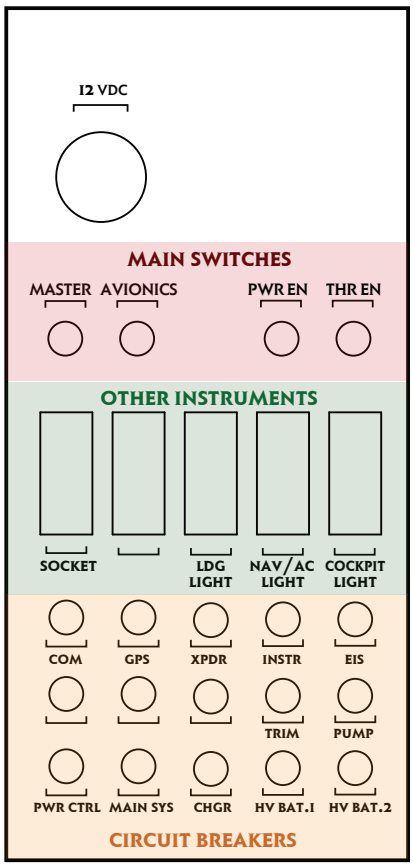
The cockpit electrical system panel incorporates a separate master switch, avionics switch, separate power enable and throttle enable switches. There are fuses located in the illuminated rectangular toggle switches, which are wired behind the avionics switch to each of the electrical avionics loads. Label positions may vary.

When using the cockpit electrical system panel, use the following sequence:

MOTOR START-UP		MOTOR SHUT-DOWN	
MASTER SWITCH	**ON**	OTHER SWITCHES	**OFF**
AVIONICS SWITCH	**ON**	THROTTLE ENABLE SWITCH	**OFF**
POWER ENABLE SWITCH	**ON**	POWER ENABLE SWITCH	**OFF**
THROTTLE ENABLE SWITCH	**ON**	AVIONICS SWITCH	**OFF**
OTHER SWITCHES	**ON as desired**	MASTER SWITCH	**OFF**

NOTE PULL OUT ALL OF THE CIRCUIT BREAKERS **IF THE MOTOR AND/OR ANY OTHER EQUIPMENT ON THE AIRCRAFT REMAINS ON AFTER THE MASTER SWITCH IS TURNED OFF. REINSERT THEM BEFORE COMMENCING WITH THE NEXT MOTOR START-UP.**

MASTER	Enable system switch
AVIONICS	Enable instruments switch
PWR EN	Power enable switch
THR EN	Throttle enable switch
SOCKET	12 VDC socket switch
LDG LIGHT	Landing light switch
NAV/AC LIGHTS	Navigation/ anti- collision lights switch
COCKPIT LIGHT	Cockpit light switch
COM	Radio circuit breaker
GPS	Navigation system circuit breaker
XPDR	Transponder circuit breaker
INSTR	Other instruments circuit breaker
EIS	Engine Information System circuit breaker
TRIM	Trim actuator circuit breaker
PUMP	Coolant pump circuit breaker
PWR CTRL	Power lever control circuit breaker
MAIN SYS	Main system circuit breaker
CHGR	Charger circuit breaker
HV BAT.1	Battery 1 circuit breaker
HV BAT.2	Battery 2 circuit breaker



Undercarriage

The tricyle undercarriage incorporates brake-equipped wheels, a U-shaped composite strut and a steerable nose wheel. The rudder pedals are used to steer the nose wheel.

Distance between main wheels:	63 " (1.6 m)
Distance between main and nose wheel:	60 " (1.52 m)
Tire, 8 ply:	4,00'' x 6'' (main wh.), 4,00'' x 4'' (nose wheel)
Tire pressure:	24 psi - 28 psi (main wheel), 18 psi (nose wheel)
Brakes:	disk type, actuated by cockpit hand lever, parking brake included
Brake fluid:	DOT 3 or DOT 4

The parking brake is applied using a lock pin on the handbrake lever. To apply it, pull the handbrake lever firmly and, while holding it back, slide the lock pin downwards into it's respective groove. To release it, simply pull back on the handbrake lever, pull the lock pin out of it's groove and release handbrake lever.

Seats and safety harnesses

The ALPHA Electro comes equipped with either stiff, leather seats or soft, fabric-covered seats. The former can be easily removed and the later folded forward, making it easy to access the aft fuselage. Seat position is fixed, whereas pedal position is adjustable. Custom made seats are available for ordering. All ALPHA Electro ship with H type safety harness attached to the fuselage at three mounting points.

Pitot-static system

The Pitot-static tube is attached to the bottom side of the starboard wing. The Pitot lines run through the inside of the wing all the way to the instrument panel.

Powerplant, propeller and energy storage

The ALPHA Electro has a out-runner type electric motor that provides direct-drive to the propeller. The motor is a 3-phase synchronous motor with permanent magnets, which exhibits high torque and above average efficiency ratings. Motor and inverter cooling is provided by a fluid based system and radiator. The power controller is mounted inside the fuselage in an IP54 enclosure. All components are protected against rain.

The system is controlled by a color-display EPSI570 cockpit interface instrument. It indicates the drive mode and important parameters to the pilot. The EPSI570 also communicates with the Battery-Management-System (BMS) and delivers information about the state of charge (SOC), battery state of health (SOH) and monitors the charging. All components communicate via the CAN interface with a proprietary communication protocol.

Motor:

TEMPERATURE °C	PEM 60MVLC
Maximum takeoff power (1 min)	60 kW
Maximum continuous power	50 kW
Maximum operating temperature	90° C
Maximum ambient temperature	40° C
RPM	**PEM 60MVLC**
Maximum allowable	2500
Takeoff RPM (typical)	2400
Climb RPM (typical)	2250

Controller:

POWER CONTROLLER	H300A
Nominal power	60 kW
Maximum operating temperature	65° C
Maximum ambient temperature	40° C

WARNING! DO NOT, UNDER ANY CIRCUMSTANCES, ATTEMPT TO USE ANY OTHER BATTERIES OTHER THAN PIPISTREL FACTORY-SUPPLIED BATTERIES. ONLY USE THEM WITH THE MOTOR AND CONTROLLER MENTIONED IN THIS POH.

Propeller type:

FP03-60E	three blade, fixed pitch propeller (wooden or composite), diameter 1640 mm

Energy storage & charging

Description:	2 metal battery boxes which include cells, BMS and communication modules, power and signal connectors
Total battery capacity:	21.0 kWh
Useful battery capacity:	20.0 kWh

CAUTION! IN ORDER TO MAINTAIN BATTERY LIFE, DISCHARGING THE BATTERY BELOW 20% CHARGE IS NOT RECOMMENDED. THE USEFUL RANGE IS CONSIDERED TO BE BETWEEN 20%-100% OF SYSTEM CHARGE.

CAUTION! ONCE THE BATTERIES REACH 0% SOC, THEY WILL BE DISCONNECTED FROM THE SYSTEM. THE 12V BATTERY SUPPLYING AVIONICS AND AUXILIARY SYSTEMS WILL STILL BE AVAILABLE.

The batteries are housed in 2 metal boxes, which contain the battery cells, the BMS and communication modules, as well as the power and signal connectors. One of the boxes is positioned firewall forward, while the other is aft of the cabin bulkhead. Be sure to always position the box in the same location, as they're not interchangeable. Make sure that all the connectors (2x power connectors, 2x CAN BUS connector, one of each per box) are fastened properly before each flight, as indicated in the EPSI570.

State of health (SOH): SOH is a measure of usable energy in the batteries. It's related to battery age, temperature and how properly the batteries have been used.
State of charge (SOC): SOC is an indication of the current charge level given the batteries current capablity, which depends on SOH

Battery management system (BMS)

Each of the battery boxes has an independent BMS, which monitors and balances the system's voltage. All the units communicate with the EPSI570 and log data from each individual battery cell. If an error occurs, EPSI570 will display a message (error code). Contact the manufacturer if this happens. Under normal circumstances the BMS requires no human intervention and is a fully automated system that takes care of itself.

Battery system	**PB345V105E-A**
Maximum voltage	398 V
Minimum voltage	288 V
Recommended voltage range for storage	355 V - 365 V
Maximum operating temperature	55° C
Minimum operating temperature	5° C
Allowable temperature range for storage	10°C - 40° C
Minimum charging temperature	0° C

CAUTION! TEMPERATURES BELOW 10°C WILL CAUSE A DECREASE IN BATTERY CAPACITY. PLAN YOUR FLIGHT ACCORDINGLY.

WARNING! DO NOT, UNDER ANY CIRCUMSTANCES, ATTEMPT TO CHARGE THE BATTERIES WITH ANY THIRD PARTY CHARGERS. ONLY PIPISTREL ORIGINAL EQUIPMENT MUST BE USED.

WARNING! RESPECT OPERATING AND STORAGE TEMPERATURE LIMITS AT ALL TIMES. FAILURE TO DO SO MAY RESULT IN BATTERY DAMAGE.

WARNING! IF YOU HAVE PURCHASED ANOTHER SET OF BATTERIES, MAKE SURE YOU DO NOT MIX THE BOXES BETWEEN SETS. THE SAME GROUP OF 2 BOXES MUST ALWAYS BE USED!

Charging

The charger is a dedicated charger ranging from **3.3kW to 20kW charging power.** Charge time will vary upon battery charge status and may be between **30 minutes to up to 2 hours.** The charger is a world-wide charger and a portable unit which can be connected to any 110V and 240V, 50 Hz or 60 Hz electrical grid or the Solar Trailer.

WARNING! BEFORE CONNECTING THE CHARGER, MAKE SURE THE AIRCRAFT ELECTRICAL SYSTEM IS OFF (MASTER SWITCH IN OFF POSITION).

FULL CHARGE PROCEDURE (fully charged battery for a flight)

- Plug the charger in.
- Unscrew the **FAST CHARGE PORT** cap.
- Plug the charger into the charging socket located in the nose of the aircraft.
- Power-up the charger using the charger's rocker switch.
- Acces the charger's display and it's menu.
- Push the "**FULL CHARGE"** button in the charger display's menu.
- Select the desired charing current from the left side of the display
- Confirm your selection with the "**CONFIRM"** button.
- The charger will initiate charging.
- The charger's display indicates when charging is completed.
- To disconnect the charger, turn the rocker switch on the right side of the charger to OFF.
- Remove the charging cable from the **FAST CHARGE PORT**.
- Place the cap back on the aircraft's charging socket.

NOTE AFTER PERFORMING A FULL CHARGE, DO NOT KEEP THE BATTERY CHARGED ABOVE 80% STATE OF CHARGE (SOC) FOR MORE THAN 5 DAYS. EITHER PERFORM A FLIGHT OR RUN THE MOTOR TO DISCHARGE THE BATTERY TO THE RECOMMENDED 50-80% SOC FOR STORAGE.

IN ORDER TO PROLONG THE BATTERY LIFE, IT IS NOT RECOMMENDED TO DISCHARGE THE BATTERY BELOW 20% SOC. USEFUL RANGE IS CONSIDERED TO BE BETWEEN 20-100% SOC.

REST CHARGE PROCEDURE (storage charge)

When the aircraft is not in use, **performing a keep-alive (storage) charge once every 90 days is required.**

- Repeat the same procedure as outlined in FULL CHARGE PROCEDURE, but instead of "**FULL CHARGE**" mode select **"REST CHARGE"** mode on the charger display.

- This will charge the battery to an optimum level for aircraft storage.

NOTE AFTER A PERIOD OF NO-FLYING ACTIVITY, PERFORM A FULL CHARGE 24 HOUR BEFORE ACTUAL FLIGHT.

Wheel brake system

The wheel brakes are disc, hydraulic type, actuated together by pulling on a the handbrake lever.

The hydraulic brake fluid used is DOT 3 or DOT 4.

Parking brake function is applied using a lock pin on the handbrake lever. To apply the parking brake, pull handbrake lever firmly and, while holding it back, slide the lock pin downwards into it's respective groove. To release it, simply pull back on the handbrake lever, pull the lock pin out of it's groove and release handbrake lever.

3 Limitations

Introduction

This section includes operating limitations, instrument markings and basic placards necessary for the safe operation of the airplane, it's motor, standard system and standard equipment.
Adhering to the limitations outlined in this section is required by law.

Airspeed limitations

	Velocity	IAS [kts (km/h)]	Remarks
VS	**Stall speed clean**	**43 (74)**	Stall speed flap up.
VS0	**Stall speed landing configuration**	**35 (64)**	Stall speed flaps full.
VFE	**Max. velocity flaps extended**	**70 (130)**	Do not exceed this speed with flaps extended (+15, +25 degrees).
VA	**Design maneuvering speed**	**86 (160)**	Do not make full or abrupt control movements above this speed.
VNE	**Velocity never to be exceeded**	**135 (250)**	Never exceed this speed in any operation.
VNO	**Velocity normal operating**	**108 (201)**	Maximum structural cruising speed in turbulent air.

Airspeed indicator markings

MARKING	IAS [kts (km/h)]	Definition
White band	**34 -70 (64 - 130)**	Full Flap Operating Range. Lower limit is the maximum weight VS0 in landing configuration. Upper limit is maximum speed permissible with flaps extended.
Green band	**40 -108 (74 - 201)**	Normal Operating Range Lower end is maximum weight VS1 at most forward C.G. with flaps retracted. Upper limit is maximum structural cruising speed.
Yellow band	**108 - 135 (201 - 250)**	Maneuver the aircraft with caution in calm air only.
Red line	**135 (250)**	Maximum speed for all operations. VNE
Blue line	**76 (140)**	Best climb rate speed (V_Y)

Powerplant limitations

WARNING! The motor is not certified for aviation use, therefore, there is no assurance it cannot fail in its operation at any given moment, without prior notice.

Motor

TEMPERATURE °C	PEM 60MVLC
Maximum takeoff power (1 min)	60 kW
Maximum continuous power	50 kW
Maximum operating temperature	90° C
Maximum ambient temperature	40° C
RPM	**PEM 60MVLC**
Maximum allowable	2500
Takeoff RPM (typical)	2400
Climb RPM (typical)	2250

Controller

POWER CONTROLLER	H300A
Nominal power	60 kW
Maximum operating temperature	65° C
Maximum ambient temperature	40° C

WARNING! DO NOT, UNDER ANY CIRCUMSTANCES, ATTEMPT TO USE ANY OTHER BATTERIES OTHER THAN PIPISTREL FACTORY-SUPPLIED BATTERIES. ONLY USE THEM WITH THE MOTOR AND CONTROLLER MENTIONED IN THIS POH.

Battery system

Battery system	PB345V105E-A
Maximum voltage	403 V
Minimum voltage	288 V
Recommended voltage range for storage	355 V - 365 V
Maximum operating temperature	60° C
Minimum operating temperature	5° C
Allowable temperature range for storage	10°C - 40° C
Minimum charging temperature	0° C

CAUTION! TEMPERATURES BELOW 10°C WILL CAUSE A DECREASE IN BATTERY CAPACITY. PLAN YOUR FLIGHT ACCORDINGLY.

WARNING! DO NOT, UNDER ANY CIRCUMSTANCES, ATTEMPT TO CHARGE THE BATTERIES WITH ANY THIRD PARTY CHARGERS. ONLY PIPISTREL ORIGINAL EQUIPMENT MUST BE USED.

WARNING! RESPECT OPERATING AND STORAGE TEMPERATURE LIMITS AT ALL TIMES. FAILURE TO DO SO MAY RESULT IN BATTERY DAMAGE.

Propeller

ALPHA Electro	Propeller
with 60 kW electric motor	three blade, fixed pitch propeller (wooden or composite, diameter 1640 mm

Motor instrument markings

Instrument	Red line (minimum)	Green arc (normal)	Yellow arc (caution)	Red line (maximum)
Tachometer (RPM)	/	0-2400	2400-2500	2500
Controller temp. (°C)	/	5-55	55-70	70
Battery system temp. (°C)	5	10-50	50-60	60

Weight limits

Basic model weights

WEIGHT	ELECTRO
Empty aircraft weight (incl. PRS and std. battery system)	379 kg
Max. takeoff weight (MTOW/MTOM)	550 kg
Minimum combined cockpit crew weight (depends on C.G. of empty aircraft)	see p. 55
Maximum combined cockpit crew weight (depends on C.G. of empty aircraft)	see p. 55

WARNING! SHOULD ONE OF THE ABOVE-LISTED VALUES BE EXCEEDED, OTHERS MUST BE REDUCED IN ORDER TO KEEP THE MTOM BELOW 550 KG. FAILING TO COMPLY WITH ANY OF THE WEIGHT LIMITATIONS MAY CAUSE UNCONTROLLED GROUND HANDLING AND/OR FLIGHT DUE TO EXTREME CENTER OF GRAVITY POSITION.

Center of gravity range

- The aircraft's safe center of gravity position ranges between 20% and 38% of mean aerodynamic chord.
- The center of gravity point ranges between 7.7" (195 mm) and 14.5" (368 mm) aft of the datum. The datum is the wing's leading edge at the fuselage root.

G-load factors

Max. positive wing load: + 4 G

Max. negative wing load: – 2 G

All parts have been tested to a safety factor of a minimum 1.875, meaning they were subjected to at least a load of 7.5 G

Service ceiling, crosswind

Service ceiling is. 12,800 ft (3900 m). Maximum crosswind component is 18 kts.

Maneuver limits

The ALPHA Electro is approved as a Light Sport Aircraft and is intended for recreational and instructional flight operations.

The following NON-aerobatic maneuvers are permitted as defined:

Power-on and -off stalls not below 1500 feet (450 meters) above ground level.

Power on and off lazy eights not below 1500 feet (450 meters) above ground level, entry speed 90 kts

Steep turns with initial speed of 80 kts.

Chandelle maneuvers not below 500 ft (150 m) above ground level, entry speed 105 kts.

WARNING! Aerobatic maneuvers, including intentional spins, are prohibited.

CAUTION! Intentional flying with both cabin doors open is prohibited. Flying with one door open in flight is approved with airspeeds up to 60 kts, flying with one door removed is approved without changes to the limitations of the normal operational envelope.

Kinds of operations

ALPHA Electro is approved for DAY - VFR operations only. Flight into known icing conditions is prohibited.

WARNING! Should you find water drops on the airframe during pre-flight check-up at temperatures close to freezing, you may expect icing to appear in flight.

Minimum equipment list (DAY - VFR)

- Placards, checklist, this POH
- Airspeed indicator (functional), Altimeter (functional), Compass (functional)
- EPSI570
- Both battery packs (functional), Safety belts (2x)

Energy limitations

Description:	2 metal boxes which include battery cells, BMS and communication modules, power and signal connectors
Total battery capacity:	21.0 kWh
Useful bat. capacity:	20.0 kWh
Maximum power with one battery box connected	35 kW

NOTE The system will function with only one of the battery boxes connected, however, the power output must be kept below 35 kW.

WARNING! Takeoff is prohibited with a state of charge below 30%.

Other restrictions

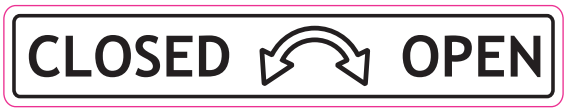
Due to flight safety reasons it is forbidden to:

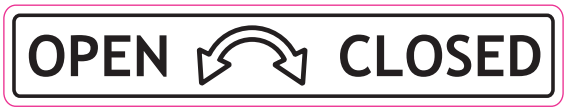
- fly in heavy rainfall
- fly during thunderstorm activity;
- fly in a blizzard
- fly according to instrument flight rules (IFR) or attempt to fly in zero visibility conditions (IMC)
- fly when the temperature of the aircraft´s surface is at risk of exceeding 55°C (130°F)
- perform aerobatic flying
- take off and land with flaps retracted at 0°
  (landing with flaps retracted is only permitted in cases of very strong winds,
  but is not to be performed as a normal procedure)
- the 12 Volt power outlet is not approved to supply power to flight-critical communication or navigation devices
- take off when state of charge is below 30%
- fly with either of the battery boxes removed

Placards

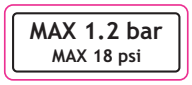
Placards (external):

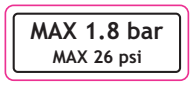
Next to door opening latches:

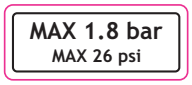




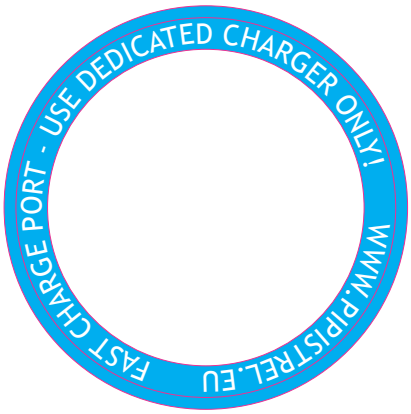
Next to wheels:





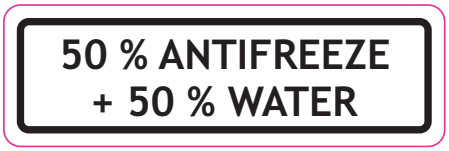


Next to battery charger:

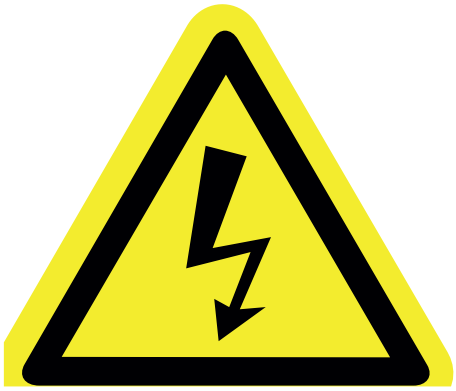


Placards (motor compartment):

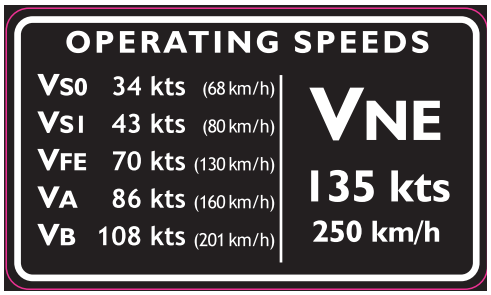
On coolant bottle, oil bottle :

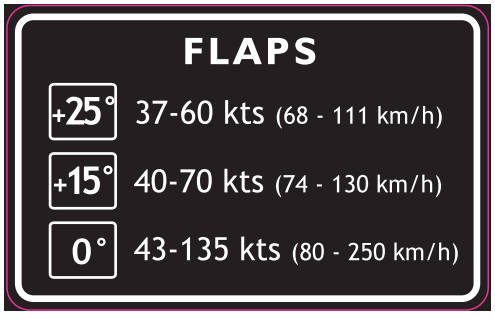


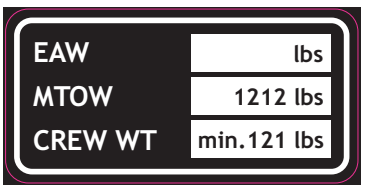
On junction box and battery packs:

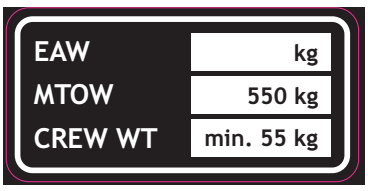


Placards (center console):





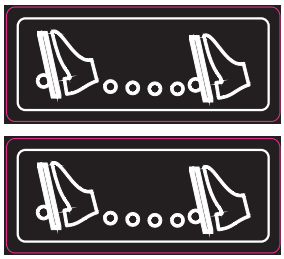




Next to microphone jacks:

Next to headphone jacks:

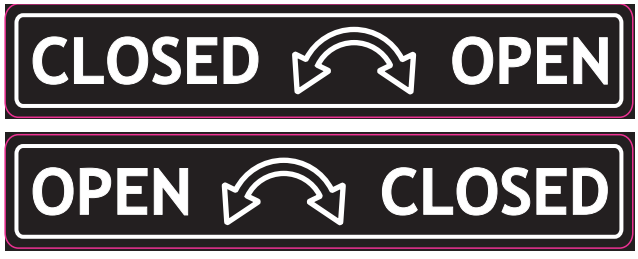
In front of control sticks (rudder pedal adjustment):



Next to throttle levers:

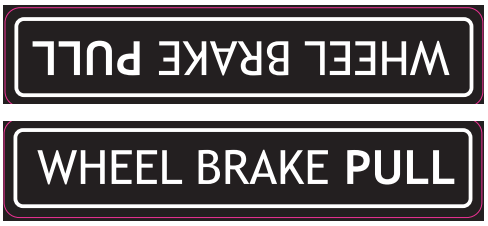
On flap lever:

Below each door to depict door handle operation:



On upper tube in front of pilot:

Next to wheel brake lever:



Next to parking brake lever:

Placards (Ballistic PRS):

ATTENTION!
ROCKET INSIDE

WARNING
ROCKET FOR PARACHUTE DEPLOYMENT INSIDE

Next to rocket exhaust (bottom of fuselage):

ROCKET GAS EXHAUST

Next to each door, top aft corner:

This aircraft is equipped with a rocket powered ballistic rescue system.

Next to activation handle (cockpit)

PULL FOR PARACHUTE DEPLOYMENT

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4 Weight and balance

Introduction

This section describes the procedure for establishing the basic empty weight and moment of the airplane. Sample calculations are provided for reference. Specific information regarding the weight and arm for this airplane as delivered from the factory can be found in the aircraft documentation folder, look for Weight and Balance Report.

WARNING! It is the responsibility of the pilot to make sure the airplane is loaded properly. Operation outside of the prescribed weight and balance limitations could result in an accident and serious or fatal injury.

Weighing procedure

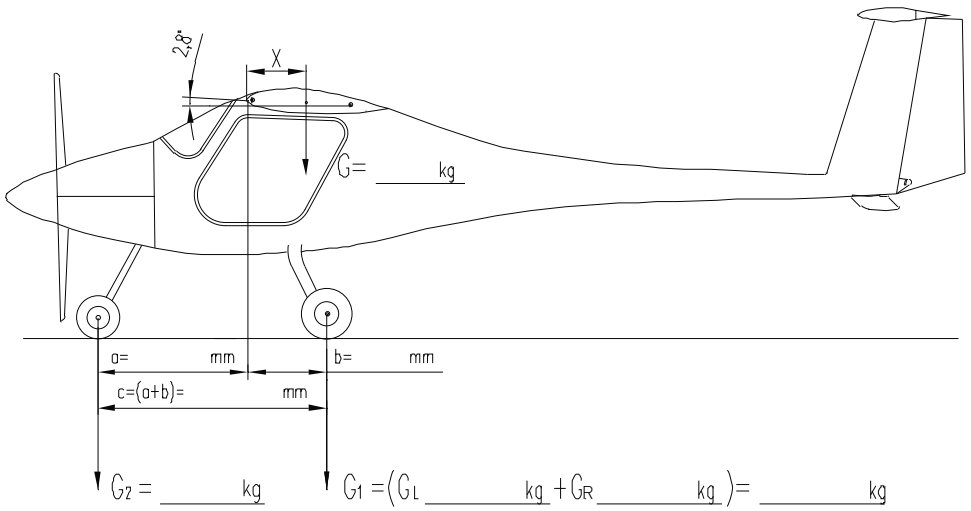
Make sure all listed aircraft parts and appliances are installed and in position.
Remove all other objects (e.g. tools, rags, tie downs and other items ...).
Install batteries.
Retract flaps and leave control surfaces centerd.
Level the aircraft inside a closed space - use the upper edge of the door frame as a levelling reference.
Once leveled, read the scale readings and subtract eventual tare weight.
Now record all readings and fill out the bottom table.

The datum is the wing's leading edge at the fuselage root. Calculate the lever arm of CG using this formula:

$$\textbf{Lever arm of CG (X)} = \frac{b \times G_1 - a \times G_2}{(G_1 + G_2)}$$

Weighing form

Weighing point and symbol	Scale reading	Tare	Net
Right main wheel (G_R)			
Left main wheel (G_L)			
$G_1 = G_R + G_L$			
Nose wheel (G_2)			
Total ($G = G_R + G_L + G_2$)			



Equipment list

The aircraft's empty weight data is unique for each and every ALPHA Electro delivered. The owner is responsible for keeping the equipment list up to date. Fill it out according to actual status.

ALPHA Electro

Serial number:

Registration number:

Equipment installed:

Determination of CG

	Weight (kg)	Weight's lever arm (mm)	Moment (inch x lbs)	Remarks
Basic cfg. empty weight				
Instruments		- 330		minus!!!
Pilots		360		
Battery front		- 450		minus!!!
Battery back		1250		

CAUTION! Each newly installed part or appliance must be registered in the upper table. Also, the new total weight and lever arm of CG values must be entered and the position of CG re-determined. Furthermore, the moment must be recalculated. This is rather easy to do. First multiply the new part's weight by it's lever arm measured from the reference point (wing's leading edge). Then sum up all moments and divide the sum by the new total weight.

WARNING! The **aircraft's safe center of gravity position ranges between 7.7" (195 mm) and 14.5" (368 mm) aft of datum and is not critically affected by cockpit crew weight.**

WARNING! Storing luggage or any other items in the battery bays is strictly prohibited!

Sample c.g. calculation

Guidelines

Gtotal is the total mass of empty aircraft. All calculations can be performed with aircraft empty weight and empty weight center of gravity (c.g.), as the pilots sit directly below the center of gravity and do not cause the c.g. to be shifted.

Basic CG formulas and calculation

Read thoroughly. Note also that the basic c.g. at 275 mm will be used purely as an example.

First, weigh the aircraft according to the procedure described in this chapter and write down values of G_1 (sum of scale readings at main wheels) and G_2 (scale reading at tail/front wheel). Then calculate the position of c.g. in millimeters (mm) from the datum (wing's leading edge at wing root).

Use the following formula:

$$CG_{(mm)} = \frac{b \times G_1 - a \times G_2}{(G_1 + G_2)} = \frac{505 \times G_1 - 1020 \times G_2}{(G_1 + G_2)} = 275 \text{ mm}$$

where:
a is the distance from nose wheel axis to wing's leading edge,
b is the distance from main wheel axis to wing's leading edge,

Second, determine the c.g. position in percentage (%) of Mean Aerodynamic Chord (MAC) with following the formula:

$$CG_{\%MAC} = \frac{CG_{mm} \times R}{MAC} \times 100 = \frac{275 \times 40}{900} \times 100 = 26.1 \%MAC$$

where:
CG_{mm} is the position of CG in millimeters (mm),
R is the difference between wing's leading edge and MAC's leading edge (40 mm),
MAC is the Mean Aerodynamic Chord (900 mm).

5 Performance

Introduction

This section provides information about the aircraft's airspeed calibration, stall speeds and general performance. All data published was obtained from test flight analysis using average flying skills.

The ALPHA Electro has demonstrated adequate motor cooling performance at ambient temperatures of up to 40°C (104 F). This is not to be regarded as a temperature limit, however higher temperatures may have an adverse effect on motor cooling and overall performance.

Airspeed indicator calibration (IAS to CAS)

The Pitot tube's mounting point and construction makes IAS to CAS correction values insignificant. Therefore pilots should regard IAS to be same as CAS. **IAS = CAS.**

Stall speeds

Stall speeds at MTOM (1210 lbs / 550 kg) for the ALPHA Electro are as follows:

Flaps 0° (retracted):	**43 kts (74 km/h)**
Flaps +15° (extended):	**37 kts (81 km/h)**
Flaps +25° (extended):	**35 kts (64 km/h)**

Takeoff performance

All data published in this section was obtained under the following conditions:

Aircraft at MTOM
Elevation: sea level
Wind: calm
Runway: grass runway
Data extrapolated for ICAO standard atmosphere

ALPHA Electro	ALPHA Electro
Takeoff ground roll at MTOM	555 ft
Takeoff runway length (over 50 ft/15 m obstacle)	870 ft

Note:

In order to meet the data for takeoff runway length over 50 ft obstacle maintain V_x (52 kts, 98 km/h) after take off.

The runway length required for takeoff may vary depending on the wind, temperature, elevation and wing & propeller surface condition.

Effect of elevation

The table below provides data about the effect of elevation on takeoff runway length.

Elevation (m)	0	500	1000	1500
Elevation (ft)	0	1640	3280	4921
Atmosph. pressure (inHg)	29.92	28.17	26.52	24.95
Atmosph. pressure (hPa)	1013	954	898	845
Outside temperature (°C)	15,0	11,7	8,5	5,2
Outside temperature (°F)	59	53	47	41
	Takeoff ground roll [ft]			
ALPHA Electro	555	700	870	1090
	Takeoff distance over 50 ft / 15 m obstacle [ft]			
ALPHA Electro	870	1035	1295	1420

WARNING: The runway length required for takeoff depends on elevation and temperature. Use the following formula to determine the runway length required: $L = 1,10 \cdot (L_h + L_t - L_0)$. Abbreviations are as follows:
L_h = takeoff runway length at present elevation, ISA standard conditions
L_t = takeoff runway length at sea level at same temperature/wind as on the given location,
L_0 = zero wind takeoff runway length at 15°C at sea level.

e.g. if the outside temperature is 25°C and you are at 500 m elevation, your takeoff runway length will be: $L = 1,10 \cdot (L_h + L_t - L_0) = 1,10 \cdot (205\ m + 215\ m - 180\ m) = 264$ meters.

Wind (head, cross or tailwind) affects aircraft's ground speed (GS). Headwind during takeoff and landing decrease the required runway length, as the GS is smaller during these two flight stages. Tailwind has the opposite effect and increases the runway length required runway length for takeoff and landing.

Every 3 kts (5 km/h) increase in **headwind** decreases the required takeoff and landing runway length by 25 feet (8 m), (e.g. provided there is 6 kts (10 km/h) of headwind on takeoff and landing, distances will be approximately 50 ft meters (16 meters) shorter than ones published in the manual).

Every 3 kts (5 km/h) increase in **tailwind** increases the required takeoff and landing runway length by 60-65 feet (18-20 meters), (e.g. provided there is 6 kts (10 km/h) of tailwind on takeoff or landing, distances will be approximately 120-130 feet (36-40 meters) longer then ones published in this manual).

WARNING! Tailwind affects takeoff and landing performance by more than twice as much as headwind does.

The table below provides data about the effect of headwind (+) and tailwind (-) on the runway length required for takeoff and landing (referenced for sea level conditions, airplane at MTOM). Relative effect is maintained at any elevation.

Windspeed (kts)	-6	-4	-2	0	4	8	12
			Takeoff runway length [ft]				
ALPHA Electro	680	645	605	555	525	495	480
			Takeoff distance over 50 ft / 15 m obstacle [ft]				
ALPHA Electro	1130	1065	965	870	810	760	720

Climb performance

ALPHA Electro	ALPHA Electro
Best climb speed	76 kts (140 km/h)
Best climb rate at MTOM, sea level	1220 fpm (6.1 m/s)
Climb rate at 100 kts (185 km/h), sea level	800 fpm (4.0 m/s)

Effect of outside air temperature

For every 5 degrees Celsius (10 F) increase in OAT versus the ISA, the climb rate decreases by 60 fpm (0.3 m/s).

Effect of altitude

The table below provides data about the effect of elevation on climb rate at best climb speed V_y at MTOM

ALPHA Electro	ALPHA Electro
0 m (0 ft)	1220 fpm (6.1 m/s)
500 m (1600 ft)	1180 fpm (5.9 m/s)
1000 m (3300 ft)	1100 fpm (5.5 m/s)
1500 m (5000 ft)	1020 fpm (5.1 m/s)

NOTE Climb rate is measured at a max continuous motor power of 45 kW with the flaps retracted (0°) at V_y and MTOM.

Climb performance may vary depending on, temperature, altitude, humidity and wing & propeller surface condition.

Cruise

Aircraft at MTOM, recommended cruise power of 20-30 kW in international standard atmosphere (ISA), sea level altitude, flaps retracted (0°):

ALPHA Electro	ALPHA Electro
Cruise airspeed	85 kts (157 km/h)

Descent

The reference sink rate with flaps extended to 25° and power at idle, measures 440 fpm (2.2 m/h) at 50 kts (92 km/h).

ALPHA Electro	ALPHA Electro
Sink rate at 50 kts (92 km/h), extended flaps (25°), zero thrust	440 fpm (2.2 m/s)
Sink rate at 50 kts (92 km/h), extended flaps (25°), with recuperation	650 fpm (3.25 m/s)

The glide

The glide is defined as unpowered wings-level flight at the speed providing best lift over drag ratio or minimum sink rate.

Should the motor become inoperative in flight, as a result of either intended or unintended actions, and it cannot be restarted, react as follows:

- establish wings-level flight at the speed providing best lift over drag ratio, if you desire to glide the greatest distance from a given altitude.

- establish wings-level flight at speed providing minimum sink rate, if you desire do stay airborne the longest. This may come in handy when you're forced to give way to other aircraft or if you simply need time to determine the most appropriate site to land out on.

ALPHA Electro	ALPHA Electro
Minimum sink speed	58 kts (108 km/h)
Minimum sink rate, flaps +15° (extended)	460 fpm (2.3 m/s)
Best lift/drag ratio speed	64 kts (118 km/h)
Best lift over drag ratio , flaps +15° (extended)	17:1

CAUTION: If the motor fails, especially in climb, the aircraft always loses some 30 meters (100 feet) of altitude before reaching best glide speed in wings-level unpowered flight.

Landing performance

Final approach speed should always be 55 kts (102 km/h) with flaps extended to 25°. The required landing runway length may also vary depending on the elevation, gross weight, touchdown velocity, wind direction and how aggressive the braking action is (i.e. recuperation).

The landing roll measures 410 ft (125 m) in the following conditions: aircraft at MTOM, airport at sea level and wind calm. Should you be flying solo, the required landing runway length decreases length shortens by another 30 ft (10 m).

Total landing distance over 50 ft/15 m obstacle measures 1510 feet (460 m).

Landing roll increases by10% for every 2000 ft (610 m) increase in density altitude.
Total landing distance increases by 2% for every 2000 ft (610 m) increase in density altitude.

Energy recuperation decreases required runway length and makes the approach steeper!

Crosswind takeoffs/landings

The maximum allowed crosswind speed on takeoff and landing with flaps extended 25° is 18 kts (33 km/h). The runway length required increases by 10% for every 5 kts of crosswind component.

6 Emergency procedures

Introduction

This chapter provides information on how to react when confronted with typical flight hazards.

NOTE SEE THE APPENDIX OF THIS MANUAL FOR A COMPLETE LIST OF SYSTEM WARNINGS AND ERRORS THAT CAN APPEAR ON THE EPSI-570 DURING OPERATION.

Stall recovery

First reduce the angle of attack by easing-off on the control stick, then

1. If the motor is running, add full power.
2. Resume horizontal flight.

Spin recovery

The ALPHA Electro is constructed in such a manner that it is difficult to fly it into an inadvertent spin. However, once spinning, react as follows:

1. If the motor is running, set throttle to idle (lever in full back position).
2. Apply full rudder deflection in the direction opposite to spin direction.
3. Lower the nose towards the ground to build up speed (stick forward).
4. As the aircraft stops spinning neutralise rudder deflection.
5. Slowly pull up and regain horizontal flight.

ALPHA Electro tends to recover from spin by itself after spinning about 90°.

WARNING! KEEP THE CONTROL STICK CENTERD ALONG ITS LATERAL AXIS (NO AILERON DEFLECTIONS THROUGHOUT THE RECOVERY PHASE!). DO NOT ATTEMPT TO STOP THE AIRCRAFT FROM SPINNING. USE THE AILERONS INSTEAD OF THE RUDDER!

WARNING! AFTER THE AIRCRAFT STOP SPINNING, RECOVERING FROM THE DIVE MUST BE PERFORMED USING GENTLE STICK MOVEMENTS (PULL), RATHER THAN OVERSTRESSING THE AIRCRAFT. HOWEVER, VNE MUST NOT BE EXCEEDED DURING THIS MANEUVER.

Resume normal flight when the aircraft is straight and level.

Motor failure

Motor failure during takeoff or initial climb

Ensure proper airspeed by lowering the nose and land the aircraft in runway heading, avoiding eventual obstacles in your way. Set master switch to the OFF position. Land straight ahead.

WARNING! DO NOT CHANGE COURSE OR MAKE TURNS IF THIS IS NOT OF VITAL NECESSITY! AFTER HAVING LANDED SAFELY, ENSURE PROTECTION OF THE AIRCRAFT AND VACATE THE RUNWAY TO KEEP THE RUNWAY CLEAR FOR ARRIVING AND DEPARTING TRAFFIC. DO THIS CALMLY AND CAREFULLY NOT TO CAUSE DAMAGE TO YOURSELF AND ANY EQUIPMENT.

Motor failure in climb

First ensure proper airspeed by lowering the nose, then start scanning the terrain underneath and choose the most appropriate site for landing out.

WARNING! THE DECISION WHERE TO LAND WHEN LANDING OUT IS FINAL! CHANGING YOUR MIND, EVEN IF YOU HAPPEN TO COME ACROSS A DIFFERENT, PERHAPS MORE APPROPRIATE LANDING SITE, SHOULD BE YOUR LAST RESORT.

Emergency landing

1. **Master switch OFF.**
2. **Fasten your seat harness tightly.**
3. **Approach and land with extreme caution with +10 km/h (+5 kts) airspeed reserve if the chosen landing terrain length permits.**
4. **Leave the aircraft immediately after landing.**

Fire

WARNING! ONLY **USE WATERLESS FIRE EXTINGUISHING AGENTS, SUCH AS FOAM, TO EXTINGUISH ANY FIRE ON THE AIRCRAFT. WATER MAY REACT WITH THE LITHIUM IN THE BATTERIES AND MAKE THE FIRE WORSE!**

Powertrain fire on ground

Should you encounter motor fire on the ground, react as follows:

1. **Come to a complete standstill, master switch OFF**
2. **Abandon the aircraft and start extinguishing the fire with a waterless agent.**

WARNING! AFTER THE FIRE HAS BEEN EXTINGUISHED DO NOT ATTEMPT TO RESTART THE MOTOR.

Powertrain fire in flight

1. **Set master switch to OFF.**
2. **Open all cabin vents.**
3. **Perform side-slip (crab) maneuver in direction opposite the fire.**
4. **Perform emergency landing procedure and leave the aircraft immediately.**

Battery system fire

Land and leave the aircraft as soon as possible.

WARNING! ONLY **USE WATERLESS FIRE EXTINGUISHING AGENTS, SUCH AS FOAM, TO EXTINGUISH ANY FIRE ON THE AIRCRAFT. WATER MAY REACT WITH THE LITHIUM IN THE BATTERIES AND MAKE THE FIRE WORSE!**

Smoke in cockpit

1. Set master switch to OFF.
2. Open all cabin vents for adequate breathing.
3. Land as soon as possible.

EPSI 570 failure

When the motor's not running: Look for a spot to carry out a safe outlanding.
When the motor's running: Do not stop the motor. Fly to the next airfield and land.

Flutter

Flutter is described as the oscillation of control surfaces. In most cases it is caused by abrupt control deflections at speeds close to or in excess of VNE. As it occurs, the ailerons, elevator or even the whole aircraft start to vibrate violently.

Should flutter occur, pull on the stick and reduce power immediately!

WARNING! FLUTTERING OF AILERONS OR TAIL SURFACES MAY CAUSE PERMANENT STRUCTURAL DAMAGE AND/OR INABILITY TO CONTROL THE AIRCRAFT.
AFTER A SAFE LANDING, THE AIRCRAFT MUST UNDERGO A SERIES OF CHECK-UPS PERFORMED BY AUTHORISED SERVICE PERSONNEL TO VERIFY AIRWORTHINESS.

Battery failure

With two battery boxes on board the battery system is automatically redundant. A failure of one battery box will be displayed on EPSI570 as a warning and the system will automatically switch to a single-battery mode, enabling continuation of flight. Power output will be reduced to 35 kW and state of charged halved. Land as soon as practical and have the battery system verified by authorised personnel.

Exceeding VNE

Should the VNE be exceeded, reduce airspeed slowly and continue flying using gentle control deflections. Land safely as soon as possible and have the aircraft verified for airworthiness by authorised service personnel.

PRS

Upon pulling the rescue system handle, the aircraft's electrical system, including the propulsion system, disengages immediately. See the manufacturer's (Prs) manual for additional emergency instructions and guidelines.

7 Normal procedures

Daily inspection

The daily inspection is the same as the pre-flight inspection.

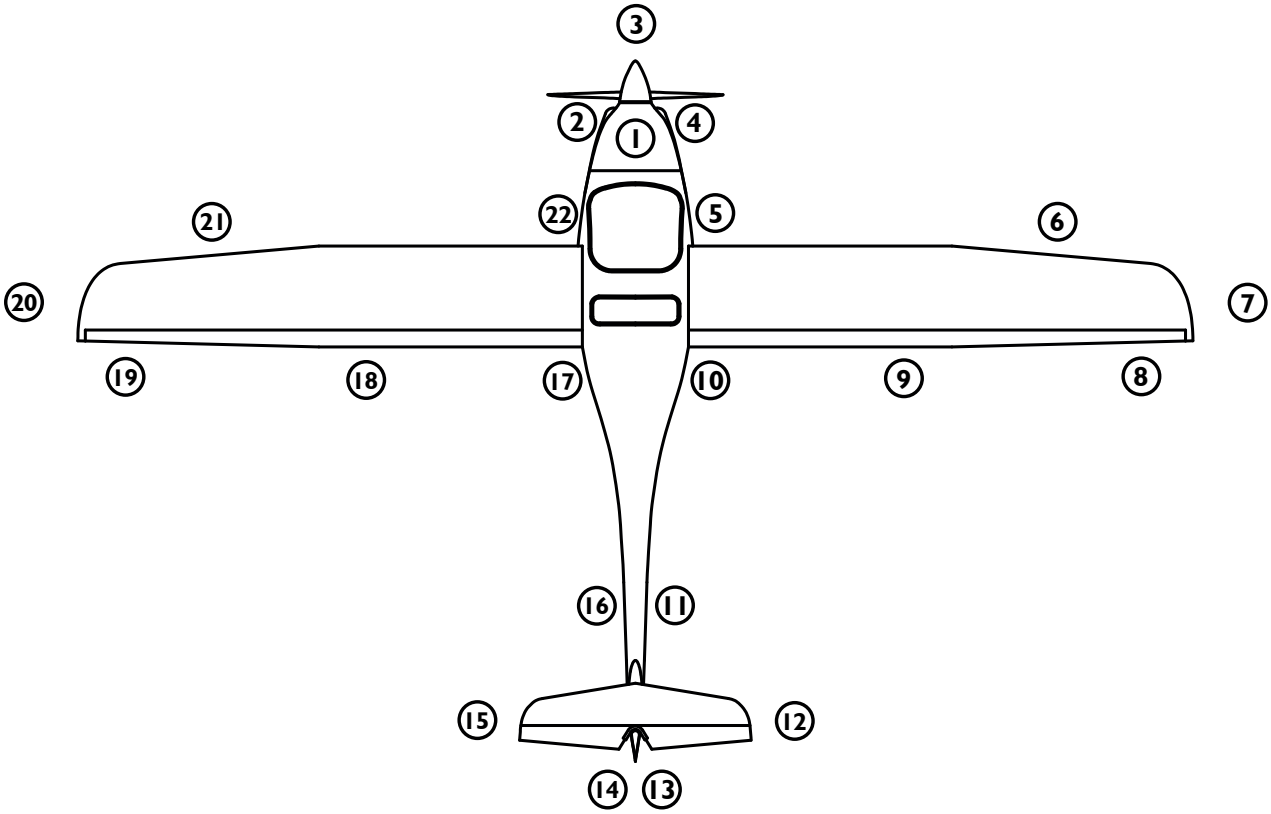
Pre-flight inspection

WARNING! Every single inspection mentioned in this chapter must be performed prior to EVERY FLIGHT, regardless of when the previous flight took place!

The person responsible for the pre-flight inspection is the pilot, who is required to perform the check-up in the utmost thorough and precise manner.

If the status of any of the parts and/or operations does not comply with conditions stated in this chapter, the damage MUST be repaired prior to motor start-up. Disobeying these instructions may result in serious additional damage to the plane and crew, including injury and loss of life!

Schematic of pre-flight inspection



1 Motor, motor cover
2 Propeller
3 Spinner, nose wheel
4 Batteries front
5 Undercarriage, RH wheel
6 Right wing - leading edge
7 Right wingtip, lights
8 Right wing - trailing edge
9 Right wing - continued
10 Fuselage (RH side)
11 Fuselage, continued (right)
12 Hor. tail surfaces (right)
13 Vert. tail surfaces (right)
14 Vert. tail surfaces (left)
15 Hor. tail surfaces (left)
16 Fuselage, continued (left)
17 Batteries back
18 Left wing - continued
19 Left wing - trailing edge
20 Left wingtip, lights
21 Left wing - leading edge
22 Undercarriage, LH wheel

Motor, motor cover ①

Cooling fluid level: half way to the top

Radiators and hoses: no mechanical damage and/or leakage

Fasteners and motor cover screws: tightened, motor cover undamaged

Batteries front ④

Battery boxes: inserted and 4 pins secured, door closed and latched.
Battery bay cooling inlet: free of all/any obstructions.
Battery box COM and PWR cables: connected.

Spinner ③

Spinner: no mechanical damage (e.g. cracks, impact spots), screws tight
Bolts and nuts: secured
Nose wheel: grab aircraft's propeller and push it towards the ground to verify proper nose wheel suspension operation. Then lift the nose wheel off the ground and check for nose leg strut free play.
Bolts: fastened
Tire: no cracks, adequate pressure
Wheel fairing: undamaged, firmly attached, clean (e.g. no mud or grass on the inside)

Propeller ②

Hub and blades: no mechanical damage (e.g. cracks), both immaculately clean
Bolts and nuts: secured

Undercarriage, wheels ⑤ ㉒

Bolts: fastened
Landing gear strut: no mechanical damage (e.g. cracks), clean
Wheel: no mechanical damage (e.g. cracks), clean
Wheel axle and nut: fastened
Fluid line (hydraulic brakes): no mechanical damage and/or leakage
Tire: no cracks, adequate pressure

Batteries back ⑰

Battery boxes: inserted and secured, door closed and latched.
Battery bay cooling inlet: free of all/any obstructions.
Battery box COM and PWR cables: connected.

Wing leading edge ⑥ ㉑

Surface condition: pristine, no cracks, impact spots, no paint and/or edge separations
Pitot tube: firmly attached, no mechanical damage or bends. Remove protection cover and make sure it is not blocked or full of water.
Wing drain holes: make sure they are not blocked and clean accordingly.

Wingtip, lights ⑦ ⑳

Surface condition: pristine, no cracks, impact spots or bumps, no paint separations

Wings' trailing edge ⑧ ⑲

Surface condition: pristine, no cracks, impact spots, no paint and/or edge separations
Aileron: pristine surface, no cracks and/or impact spots, no paint abnormalities and edge separations, no vertical or horizontal free play, smooth and unobstructed deflections

Charger door ⑨ ⑱

Charger door: secured.

Fuselage, antenna, rescue parachute cover ⑩ ⑰

Kevlar belt covers: firmly attached, not damaged
Flaperon control system cover, antenna: firmly attached

Fuselage, continued ⑪ ⑯

Surface condition: pristine, no cracks, impact spots or bumps, no paint separations

Horizontal tail surfaces ⑫ ⑮

Surface condition: pristine, no cracks, impact spots or bumps, no paint and/or edge separations
Hinges: no free play in any direction
Horizontal stabilizer attachment mechanism: fastened and secured
Mylar seals covering the gap between horizontal tail surfaces: in position
Elevator: smooth and unobstructed up-down movement, no side-to-side free play

Vertical tail surfaces ⑬ ⑭

Vertical fin bottom part: no cracks, impact spots or paint separations along main chord
Surface condition: pristine, no cracks, impact spots or bumps, no paint separations
Hinges: no free play in any direction
Rudder cable endings: intact, bolts in position
Mylar seals covering the gap between vertical tail surfaces: in position

CAUTION! Pre-flight inspection should be performed following stations 1 through 22!

Cockpit pre-flight inspection

PRS activation handle safety pin:	- IN POSITION AND SECURED
Main wing spars and connectors:	- NO VISIBLE ABNORMALITIES OF METAL PARTS, SPARS, PINS AND BOLTS - ALL BOLTS AND NUTS IN POSITION
Pitot-static lines and wing tip lights electrical cables:	- CONNECTED PROPERLY AND IN POSITION
Instrument panel and instruments:	- VISUAL INSPECTION
Master switch OFF:	- NO CONTROL LIGHTS AND/OR ELECTRONIC INSTRUMENT ACTIVITY
Master switch ON:	- EPSI570 IS ENABLED
Battery capacity display:	- CLEAN WITH NO CRACKS.
Avionics switch	- ON
Make sure you have set all instruments to correct initial setting	- QNH, COMM FREQUENCY SET
Radio:	- FUNCTION CHECK
Elevator trim:	- VERIFY TRAVEL - SET TO NEUTRAL
Master/Avionics switch:	- OFF
Flap handle:	- BUTTON SPRING FIRM - LOCKING MECHANISM WORKING PROPERLY - SMOOTH MOVEMENT ALONG FULL DEFLECTIONS - NO FREE PLAY OR VISIBLE DAMAGE
Parking brake:	- APPLIED
Controls:	- FREE ALL/ANY OBSTRUCTIONS

Normal procedures and recommended speeds

To enter the cabin, first lift the door all the way to the wing's bottom surface. The silver knob will grab and secure the door in position. Sit on the cabin's edge and grab it to support your body. Drag yourself onto the seat, lifting only one leg over the stick for best position. Immediately after positioning yourself in the seat, check that the position of the rudder pedals suits your size and needs. Note that it's also adjustable during flight.

To lower the door DO NOT attempt to grab and pull door's handle, but gently pull the silver knob instead. To secure the door, rotate the handle so that it locks and verify that all three closing points are secured.

Fasten the safety belts according to your size.

Adjust the rudder pedals according to your required legroom. Sit inside the cockpit and release the pressure off the pedals. Pull the black knob in front of the control stick to bring the pedals closer to you. To move the pedals further away, first release the pressure of the pedals, then pull on the knob slightly (this will release the locking mechanism). Now push the pedals forward using your feet, while simultaneously pulling on the black adjustment knob.

WARNING! Tighten both the bottom and shoulder straps of the safety harness so that you're completely secured in your seat. This is especially important when flying in turbulent conditions, as turbulence can cause injury to passengers not wearing their saftey harness.

Motor start-up

Before motor start-up

CAUTION! To ensure proper and safe use of the aircraft it is essential to familiarise yourself with the motor's limitations and motor manufacturer's safety warnings. Before motor start-up make sure the area in front of the aircraft is clear. It is recommended to start the motor up with the aircraft's nose pointing into the wind.

Check the state of charge to make sure there is sufficient battery power for the planned duration of flight.
Make sure the pitot tube is uncovered and rescue parachute safety pin removed.
Apply the wheel brakes. Apply parking brake.

Motor start-up

See Motor Start-Up on page 2-5. If throttle lever is not in "idle" the motor/propeller will not start running. After moving the throttle lever to "idle", apply power and the motor will start running.

Motor warm-up procedure

No warm-up is necessary.

CAUTION! If the motor RPM is less than 2000 or greater than 2500, check the system for correct installation. Do not proceed with flight.

Taxi

Release parking brake if set and release the handbrake. Taxiing technique does not differ from other aircraft equipped with a steerable nose wheel. Prior to taxiing it is essential to check the wheel brakes for proper braking action.

Holding point

Make sure motor temperatures at full power range are within operational limits.
Make sure the safety belts are fastened and doors closed and secured at all three closing points.
For short field operations extend flaps 25°. For all other operations extend them to 15°.
Power idle.

Takeoff and initial climb

Before lining-up, verify the following:

Parking brake / brakes : Released
Battery SOC: sufficient
Safety belts: fastened
Cabin doors: closed securely
Trim handle: in neutral position or slightly forward
Flap handle: extended 25°, when using long runways use of extended 15° flaps for takeoff is also permitted.
Runway: clear

Now release brakes, line up and apply full power.
Verify motor PWR at full throttle greater than 60 kW.

CAUTION! Keep adding power gradually, as sudden bursts of power can cause airframe damage on certain runways due to rocks and debris.

WARNING! If the motor PWR is less than 60 kW at full throttle, ABORT TAKE OFF IMMEDIATELY, come to a standstill and verify systems.

Start the takeoff roll pulling the control stick one third backward and lift the nose wheel off the ground as you accelerate. Reaching 40-43 kts (75-80 km/h), gently pull on the stick to get the aircraft airborne.

CAUTION! Takeoff with **crosswind (max 18 kts) should be performed with the control stick pointed into the wind. Special attention should be paid to maintaining runway heading!**

Initial climb

When airborne, apply brakes momentarily to prevent in-flight wheel spinning.
Accelerate at full power and maintain proper climbing speed.
When you reach 60 kts (110 km/h) above 150 ft (50 m), extend the flaps to 15°. Retract the flaps to 0° after reaching 70 kts (130 km/h) at 300 ft (100 m). Reduce power to 40 kW and continue climbing at 76 kts (140 km/h).
Adjust the trim to neutralise stick force if necessary.
Remember to keep the motor temperatures and RPM within operational limits during climb out.

CAUTION! Reduce power and lower nose (i.e. increase speed) if additional motor cooling is required.

Cruise

When horizontal flight has been established, verify on-board energy quantity again.
Keep the aircraft balanced while maintaining desired flight parameters.

To conserve energy, cruise at 85 kts (157 km/h) or slower.

Cruising in rough conditions

Should you experience turbulence, reduce airspeed below VNO and continue flying with flaps retracted (0°).

CAUTION! In rough air, reduce motor power if necessary to keep airspeed below VNO.

Descent and final approach

Descend at speeds at or below VNO with the flaps retracted (0°)

For approach reduce speed to 70 kts (130 km/h) and extend flaps to 15° only after turning to base leg.
Adjust motor power to maintain proper airspeed. Set the trim to neutralise stick force if necessary.
During the descent, monitor temperatures and keep them within operational limits.

CAUTION! With power lever set close to idle, the motor will recuperate energy during the descent and the vertical sink speed will increase, similar to the effects of airbrakes on sailplanes.

On final, extend flaps to 25°.
Align the aircraft with the runway and reduce power to idle.
Maintain an airspeed of 55 kts (102 km/h).
Use the throttle to control your descent glide path. Control your attitude and crab if necessary.

CAUTION! Crosswind landings require higher final approach speeds to ensure safe maneuvrability. Increase the approach speed by 1 kts for every 1 kts of crosswind component e.g. If there's a crosswind component of 5 kts, increase the approach speed by 5 kts.

Roundout and touchdown

CAUTION! See chapter "Performance" for landing performance.

Roundout and touchdown (flare) occurs at following airspeeds:

Calm air, aircraft at MTOM	**40 kts (75 km/h) IAS**
Rough air, aircraft at MTOM (incl. strong crosswinds up to 34 km/h (18 kts))	**42 kts (78 km/h) IAS**

CAUTION! Land the aircraft in such a manner that the two main wheels touch the ground first, allow the nose-wheel touchdown only after speed has been reduced below 25 kts. When lowering the nose wheel to the runway the rudder MUST NOT be deflected in any direction (rudder pedals centered).

When on the ground, start the braking action while holding the control stick in full back position. Steer the aircraft using the rudder only. If the runway length is sufficient, come to a complete standstill without engaging the brakes, while holding the control stick slightly backwards as you slow down.

Crosswind approach and roundout

CAUTION! Crosswinds prolong landing runway length due to elevated airspeed

When performing a crosswind landing, the wing-low method should be used. When using the wing-low method it is necessary to gradually increase the deflection of the rudder and aileron to maintain the proper amount of drift correction.

WARNING! If the crab method of drift correction has been used throughout the final approach and roundout, the crab must be recovered before the touchdown. Do this by applying rudder to align the aircraft's longitudinal axis with its direction of movement.

Parking

Come to a complete standstill by using the handbrake lever. Carry out Motor Shut-down (see page 2-5). Insert PRS handle's safety pin. Apply the parking brake. Open cabin door, unfasten safety belts and exit the cabin. Chock the wheels and cover the pitot tube with it's protective sleeve.

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8 Handling and maintenance

Special inspections

After having exceeded VNE or landed in a rough manner:

Check the undercarriage, fuselage & wing surfaces and main spars for abnormalities. It is highly recommended to have the aircraft verified for airworthiness by authorised service personnel.

Clicking noise overhead

The wings are factory fitted to the fuselage to make a tight fit at approximately 80 F. When exposed to low temperatures, materials shrink. Therefore, flying in the winter or in cold temperatures, you may encounter "click-clack" like noises above your head. The remedy for this unpleasant noises is to add washers, typically of 0,5 mm thickness in-between wing and fuselage. Washers must be added both at rear and front bushings at one side of the fuselage only!

WARNING! It is mandatory to consult the manufacturer or authorised service personnel before applying washers!

Battery inspection

Make sure the battery boxes are secure and that both cables are properly connected. Check for any signs of wire/cable damage or shafing.

Tie down

Point the aircraft into the wind and retract (0°) flaps fully. Chock all three wheels. Put an extra rope around the tail-cone and into the slot between the propeller and the spinner. When using rope of a non-synthetic material, leave sufficient slack to avoid damage to the aircraft. To tie down the tail, tie a rope through the tail skid and secure it to the ground. When finished, cover the pitot tube with a protection cover.

Storage

Ideally, the aircraft should be stored in a hangar. For increased in-hangar maneuvrability use of an original Pipistrel push-cart is recommended. Stuff the battery bay cooling inlets with some foam or a rag to prevent the ingress of dirt, dust, small animals, etc..
The PRS is installed in your aircraft, so make sure the activation handle safety pin is inserted every time you leave the aircraft.
Should the aircraft be stored for a longer period of time (more than 6 months), disconnect the 12V battery in the cockpit to prevent the battery from over-discharging during storage.

CAUTION! Follow the instructions given in the battery/charging section in chapter "Aircraft and Systems".

Cleaning

Use fresh water and a soft piece of cloth to clean the aircraft's exterior. If you are unable to remove certain spots, consider using mild detergents. Afterwards, rinse the entire surface thoroughly.
The Lexan surfaces are protected by an anti-scratch layer on the outside. To avoid damaging these protective layers and coatings, always use fresh water only to clean the surfaces.
To protect the aircraft's surface (excluding Lexan surfaces) from the environmental contaminants, use high quality car wax.
The interior is to be cleaned with a vacuum cleaner.
Cover or stuff the battery pack cooling inlets with foam or protective tape to prevent water or cleaning solutions from entering the battery bays.

Keeping your aircraft in perfect shape

In order for the ALPHA Electro to perform the way it should, all of the airframe's surfaces must cleaned on a regular basis. This is especially true for the wing's leading edges, which can seriously affect performance if left dirty. Cleaning must be carried out carefully, so that the aircraft's composite surfaces don't incur any damage.

Precautions

Rubbing any of the aircraft's surfaces aggressively or polishing any of them is not permitted and, if necessary, can only be carried out by an approve maintenance organization.

Avoid the use of ALL aggressive cleaning solutions and organic solvents whenever possible, including window cleaning spray, benzene, aggressive shampoos etc.

When flying in regions with a lot of bugs in the air the leading edges of the airframe (propeller, wings, tail) need to be protected before flight with antistatic furniture spray cleaner such as Pronto (transparent, manufacturer: Johnson Wax), or something equivalent. When using such spray, do not apply it directly onto the wing but onto a soft cloth instead (old T-shirts are best).

After having finished with flight activity for the day, clean the leading edges of the airframe as soon as possible with a lot of water and a drying towel (chamois, artificial leather skin). This will be very easy to do if the leading edge was sprayed with an antistatic spray cleaner before flight.

Post-flight wash down

Bugs, which represent the most of the dirt to be found on the airframe, are to be removed with clean water and a soft cloth (this can also be done using a drying towel, chamois or artificial leather skin). Begin by soaking all the leading edges of the airframe first. Then wipe the aircraft's entire surface until it is completely dry. Clean the propeller and remove any grease spots separately using a mild car shampoo with a wax.

CAUTION! Do not, under any circumstances attempt to use aggressive cleaning solutions, as you will severely damage the lacquer, which is the only protective layer before the structural laminate.

When using the aircraft in difficult atmospheric conditions (intense sunshine, dusty winds, coastline, acid rains etc.) make sure to clean the outer surface more thoroughly.

CAUTION! Do not, under any circumstances attempt to remove such bug-spots with abrasive sponges and/or rough polishing pastes.

Periodical cleaning of all outer surfaces with car shampoo

It is recommended the aircraft be cleaned from top to bottom using a soft sponge. Be careful not to use a sponge that is contaminated with any fine particles, such as those found in mud and sand, as this could abrade/damage the surface. While cleaning, soak the surface and the sponge many, many times. Use a separate sponge to clean the bottom of the fuselage, as is it usually greasier than the rest of the airframe. When pouring water over the airframe, be careful not to direct it over the charger door, battery inlets, wing-fuselage joining section, PRS straps and cover, pitot tube, tail static probe and/or motor cowlings.

Always rinse the shampooed surfaces again before they dry, then just wipe the whole aircraft dry using a drying towel, chamois or artificial leather skin. Also, clean the control surface gap seals on the empennage. Lift the seals gently and insert ONE layer of cloth underneath, then move along the whole span of the seal.

Cleaning the transparent Lexan surfaces

All the of the ALPHA Electro's window surfaces are made of Lexan. Cleaning Lexan is not the same as cleaning Plexiglas. It is really important to only use clean water (no cleaning solutions are necessary) when cleaning and a really clean drying towel.

CAUTION! Do not use the towel that was used to dry the airframe's surfaces to dry the window surfaces. Use another unused towel for the window surfaces.

Should the window surfaces be dusty, remove the dust first by pouring water (not spraying!) and gliding your hand over the surface. Glide the drying towel over the surface, squeeze it out and soak it before touching the Lexan again. If there are bugs on the windshield, soak them with plenty of water first, so less wiping is necessary. After drying the window surface, apply some antistatic furniture spray cleaner such as Pronto (transparent, manufacturer: Johnson Wax), or something similar and wipe the surface clean with a separate soft cotton cloth.

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9 Appendix

PRS: use, handling and maintenance

System description

The PRS provides you with a chance to rescue yourself from an unexpected situation.
The system is placed inside a durable cylinder mounted on the starboard side of the baggage compartment. The parachute is Inside this cylinder and stored inside a deployment bag with a rocket underneath.
This brand new design deploys a canopy that is not gradually drawn from the container or exposed to distortion by air currents, but it actually opened safely in 0,4 to 0,7 seconds over at 50-60 ft above the aircraft. It incorporates a special deployment bag, which decreases the risk of aircraft debris damaging the canopy.
The PRS is activated manually, by pulling the activation handle mounted on the top of the cabin bulkhead. After being fired, the main canopy opens and fully inflates in about 3.2 seconds.

WARNING! Activation handle safety pin should be inserted when the aircraft is parked or stored in a hangar to prevent accidental deployment. However, the instant pilot boards the aircraft, the safety pin MUST be removed!

Using the PRS

Typical situations for use of the PRS are:

- structural failure
- mid-air collision
- loss of aircraft control
- motor failure over hostile terrain
- pilot incapacitation (incl. heart attack, stroke, temp. blindness, disorientation...)

Prior to activating the system (if time permits):

- shut the motor down and set the master switch to OFF
- fasten safety harnesses tightly
- protect your face and body

To deploy the parachute, firmly pull the activation handle out towards the instrument panel until it extends at least 15" (38 cm) out of it's housing.

Once you have pulled the handle and the rocket has deployed, it will be about two seconds before you feel the impact produced by two forces. The first force is that of the system stretching. The second force follows after the canopy opens. It will seem as if the aircraft has pulled backwards briefly. The airspeed is reduced instantly and the aircraft begins descending.

As a pilot you should know that the phase following parachute deployment is unpredictable. If in such a situation for the first time, understand that determining where to land and doing so properly is out of your control.

CAUTION! Should you end up in power lines (carrying electrical current), DO NOT under any circumstances touch any metal parts inside or outside the cockpit. This also applies to anyone attempting to help or rescue you. Be aware that anyone touching any part of the aircraft while standing on the ground will probably suffer mayor injury or die of electrocution. Therefore, you are strongly encouraged to confine your movements until qualified rescue personnel arrives at the site to assist you.

After the PRS has been used or if you suspect any possible damage to the system, do not hesitate and immediately contact the manufacturer!

Handling and maintenance

Prior to every flight all visible parts of the system must be checked for proper condition. Special attention should be paid to corrosion on the activation handle inside the cockpit. Also, the main fastening straps on the outside of the fuselage must be undamaged at all times.
Furthermore, neither system, nor any of its parts should be exposed to moisture, vibration and UV radiation for long periods of time to ensure proper system operation and life.

CAUTION! It is strongly recommended to thoroughly inspect and grease the activation handle, preferably using silicon spray, every 50 flight hours.

All major repairs and damage repairs MUST be done by the manufacturer or authorised service personnel.

For all details concerning the PRS rescue system, please see the "PRS - Galaxy Rescue System Manual for Assembly and Use".

Training/Familiarisation supplement

Pipistrel offers additional computer-based training for anyone interested in becoming more familiar with the ALPHA Electro. Contact Pipistrel to find out more!

Conversion tables

Kilometers per hour (km/h) - knots (kts) - meters per sec. (m/s)

km/h	kts	m/s	km/h	kts	m/s	km/h	kts	m/s
1,853	1	0,37	63,00	34	18,34	124,16	67	36,15
3,706	2	1,07	64,86	35	18,88	126,01	68	36,69
5,560	3	1,61	66,71	36	19,42	127,87	69	37,23
7,413	4	2,15	68,56	37	19,96	129,72	70	37,77
9,266	5	2,69	70,42	38	20,50	131,57	71	38,31
11,11	6	3,23	72,27	39	21,04	133,43	72	38,86
12,97	7	3,77	74,12	40	21,58	135,28	73	39,39
14,82	8	4,31	75,98	41	22,12	137,13	74	39,93
16,67	9	4,85	77,83	42	22,66	198,99	75	40,47
18,53	10	5,39	79,68	43	23,20	140,84	76	41,01
20,38	11	5,93	81,54	44	23,74	142,69	77	41,54
22,23	12	6,47	83,39	45	24,28	144,55	78	42,08
24,09	13	7,01	85,24	46	24,82	146,40	79	42,62
25,94	14	7,55	87,10	47	25,36	148,25	80	43,16
27,79	15	8,09	88,95	48	25,90	150,10	51	43,70
29,65	16	8,63	90,80	49	26,44	151,96	82	44,24
31,50	17	9,17	92,66	50	26,98	153,81	83	44,78
33,35	18	9,71	94,51	51	27,52	155,66	84	45,32
35,21	19	10,25	96,36	52	28,05	157,52	85	45,86
37,06	20	10,79	98,22	53	28,59	159,37	86	46,40
38,91	21	11,33	100,07	54	29,13	161,22	87	46,94
40,77	22	11,81	101,92	55	29,67	163.08	88	47,48
42,62	23	12,41	103,77	56	30,21	164,93	89	48,02
44,47	24	12,95	105,63	57	30,75	166,78	90	48,56
46,33	25	13,49	107,48	58	31,29	168,64	91	49,10
48,18	26	14,03	109,33	59	31,83	170,49	92	49,64
50,03	27	14,56	111,19	60	32,37	172,34	93	50,18
51,80	28	15,10	113,04	61	32,91	174,20	94	50,12
53,74	29	15,64	114,89	62	33,45	176,05	95	51,26
55,59	30	16,18	116,75	63	33,99	177,90	96	51,80
57,44	31	16,72	118,60	64	34,53	179,76	97	52,34
59,30	32	17,26	120,45	65	35,07	181,61	98	52,88
61,15	33	17,80	122,31	66	35,61	183,46	99	53,42

Knots (kts) - meters per second (m/s)

	0	1	2	3	4	5	6	7	8	9
0	0	0,51	1,02	1,54	2,05	2,57	3.08	3,60	4,11	4,63
10	0,51	5,65	6,17	6,66	7,20	7,71	8,23	8,74	9,26	9,77
20	10,28	10,80	11,31	11,83	12,34	12,86	13,37	13,89	14,40	14,91
30	25,43	15,94	16,46	16,97	17,49	18,00	18,52	19,03	19,54	20,06
40	20,57	21,09	21,60	22,12	22,63	23,15	23,66	24,17	24,69	25,20
50	25,72	26,23	26,75	27,26	27,76	28,29	28,80	29,32	29,83	30,35
60	30,86	31,38	31,89	32,41	32,92	33,43	33,95	34,46	34,98	35,49
70	36,00	36,52	37,04	37,55	38,06	38,58	39,09	39,61	40,12	40,64
80	41,15	41,67	42,18	42,69	43,21	43,72	44,24	44,75	45,27	45,78
90	46,30	46,81	47,32	47,84	48,35	48,87	49,38	49,90	50,41	50,90

Meters per second (m/s) - feet per minute (100 ft/min)

m/sec.		100 ft/min	m/sec.		100 ft/min	m/sec.		100 ft/min
0,50	1	1,96	10,66	21	41,33	20,82	41	80,70
1,01	2	3,93	11,17	22	43,30	21,33	42	82,67
1,52	3	5,90	11,68	23	45,27	21,84	43	84,64
2,03	4	7,87	12,19	24	47,24	22,35	44	86,61
2,54	5	9,84	12,75	25	49,21	22,86	45	88,58
3,04	6	11,81	13,20	26	51,18	23,36	46	90,53
3,55	7	13,78	13,71	27	53,15	23,87	47	92,52
4,06	8	15,74	14,22	28	55,11	24,38	48	94,48
4,57	9	17,71	14,73	29	57,08	24,89	49	96,45
5,08	10	19,68	15,24	30	59,05	25,45	50	98,42
5,58	11	21,65	15,74	31	61,02	25,90	51	100,4
6.09	12	23,62	16,25	32	62,92	26,41	52	102,3
6,60	13	25,51	16.76	33	64,96	26,92	53	104,3
7,11	14	27,55	17,27	34	66,92	27,43	54	106,2
7,62	15	29,52	17,78	35	68,89	27,94	55	108,2
8,12	16	31,49	18,28	36	70,86	28,44	56	110,2
8,63	17	33,46	18,79	37	72,83	28,95	57	112,2
9,14	18	35,43	19,30	38	74,80	29,46	58	114,1
9,65	19	37,40	19,81	39	76,77	29,97	59	116,1
10,16	20	39,37	20,32	40	78,74	30,48	60	118,1

ICAN (international committee for air navigation) temperatures, relative pressure, relative density and CAS to TAS correction factors as related to altitude

Altitude		Temperature		Relative pressure	Relative density	Cor. factors
feet	metres	°C	°F			
-2.000	-610	18,96	66,13	1,074	1,059	0,971
-1	-305	16,98	62,56	1,036	1,029	0,985
0	0	15	59	1	1	1
1.000	305	13,01	55,43	0,964	0,971	1,014
2.000	610	11,03	51,86	0,929	0,942	1,029
3.000	914	9,056	48,30	0,896	0,915	1,045
4.000	1219	7,075	44,73	0,863	0,888	1,061
5.000	1524	5,094	41,16	0,832	0,861	1,077
6.000	1829	3,113	37,60	0,801	0,835	1,090
1.000	2134	1,132	34,03	0,771	0,810	1,110
8.000	2438	-0,850	30,47	0,742	0,785	1,128
9.000	2743	-2,831	26,90	0,714	0,761	1,145
10.000	3090	-4,812	23,33	0,687	0,738	1,163
11.000	3353	-6,793	19,77	0,661	0,715	1,182
12.000	3658	-8,774	16,20	0,635	0,693	1,201
13.000	3916	-10,75	12,64	0,611	0,671	1,220
14.000	4267	-12,73	9,074	0,587	0,649	1,240
15.000	4572	-14,71	5,507	0,564	0,629	1,260
16.000	4877	-16,69	1,941	0,541	0,608	1,281
17.000	5182	-18,68	-1,625	0,520	0,589	1,302

Meters (m) to feet (ft) conversion table

metres (m)		feet (ft)	metres (m)		feet (ft)	metres (m)		feet (ft)
0,304	1	3,280	10,36	34	111,5	20,42	67	219,81
0,609	2	6,562	10,66	35	114,8	20,72	68	223,09
0,914	3	9,843	10,97	36	118,1	21,03	69	226,37
1,219	4	13,12	11,27	37	121,3	21,33	70	229,65
1,524	5	16,40	11,58	38	124,6	21,64	71	232,94
1,828	6	19,68	11,88	39	127,9	21,91	72	236,22
2,133	7	22,96	12,19	40	131,2	22,25	73	239,50
2,438	8	26,24	12,49	41	134,5	22,55	74	242,78
2,743	9	29,52	12,80	42	137,7	22,86	75	246,06
3,048	10	32,80	13,10	43	141,1	23,16	76	249,34
3,352	11	36,08	13,41	44	144,3	23,46	77	252,62
3,657	12	39,37	13,71	45	147,6	23,77	78	255,90
3,962	13	42,65	14,02	46	150,9	24,07	79	259,18
4,267	14	45,93	14,32	47	154,1	24,38	80	262,46
4,572	15	49,21	14,63	48	157,4	24,68	81	265,74
4,876	16	52,49	14,93	49	160,7	24,99	82	269,02
5,181	17	55,77	15,24	50	164,1	25,29	83	272,31
5,48	18	59,05	15,54	51	167,3	25,60	84	275,59
5,791	19	62,33	15,84	52	170,6	25,90	85	278,87
6,096	20	65,61	16,15	53	173,8	26,21	86	282,15
6,400	21	68,89	16,45	54	177,1	26,51	87	285,43
6,705	22	72,17	16,76	55	180,4	26,82	88	288,71
7,010	23	75,45	17,06	56	183,7	27,12	89	291,99
7,310	24	78,74	17,37	57	187,0	27,43	90	295,27
7,620	25	82,02	17,67	58	190,2	27,73	91	298,55
7,948	26	85,30	17,98	59	193,5	28,04	92	301,83
8,220	27	88,58	18,28	60	196,8	28,34	93	305,11
8,530	28	91,86	18,59	61	200,1	28,65	94	308,39
8,830	29	95,14	18,89	62	203,4	28,90	95	311,68
9,144	30	98,42	19,20	63	206,6	29,26	96	314,96
9,448	31	101,7	19,50	64	209,9	29,56	97	318,24
9,750	32	104,9	19,81	65	213,2	29,87	98	321,52
10,05	33	108,2	20,12	66	216,5	30,17	99	324,80

Air pressure as related to altitude

altitude (m)	pressure (hPa)	pressure (inch Hg)	altitude (m)	pressure (hPa)	pressure (inch Hg)
-1000	1139,3	33,6	1300	866,5	25,6
-950	1132,8	33,5	1350	861,2	25,4
-900	1126,2	33,3	1400	855,9	25,3
-850	1119,7	33,1	1450	850,7	25,1
-800	1113,2	32,9	1500	845,5	25,0
-750	1106,7	32,7	1550	840,3	24,8
-700	1100,3	32,5	1600	835,2	24,7
-650	1093,8	32,3	1650	830	24,5
-600	1087,5	32,1	1700	824,9	24,4
-550	1081,1	31,9	1750	819,9	24,2
-500	1074,3	31,7	1800	814,8	24,1
-450	1068,5	31,6	1850	809,8	23,9
-400	1062,3	31,4	1900	804,8	23,8
-350	1056,0	31,2	1950	799,8	23,6
-300	1049,8	31,0	2000	794,9	23,5
-250	1043,7	30,8	2050	790,0	23,3
-200	1037,5	30,6	2100	785,1	23,2
-150	1031,4	30,5	2150	780,2	23,0
-100	1025,3	30,3	2200	775,3	22,9
-50	1019,3	30,1	2250	770,5	22,8
0	1013,3	29,9	2300	165,7	22,6
50	1007,3	29,7	2350	760,9	22,5
100	1001,3	29,6	2400	756,2	22,3
150	995,4	29,4	2450	751,4	22,2
200	989,4	29,2	2500	746,7	22,1
250	983,6	29,0	2550	742,1	21,9
300	977,7	28,9	2600	737,4	21,8
350	971,9	28,7	2650	732,8	21,6
400	966,1	28,5	2700	728,2	21,5
450	960,3	28,4	2750	723,6	21,4
500	954,6	28,2	2800	719	21,2
550	948,9	28,0	2850	714,5	21,1
600	943,2	27,9	2900	709,9	21,0
650	937,5	27,7	2950	705,5	20,8
700	931,9	27,5	3000	701,0	20,7
750	926,3	27,4	3050	696,5	20,6
800	920,0	27,2	3100	692,1	20,4
850	915,2	27,0	3150	687,7	20,3
900	909,0	26,9	3200	683,3	20,2
950	904,2	26,7	3250	679,0	20,1
1000	898,7	26,5	3300	674,6	19,9
1050	893,3	26,4	3350	670,3	19,8

ICAO standard atmosphere

h (m)	h (ft)	T (°C)	T (°K)	T/T₀	p (mmHg)	p (kg/m²)	p/p₀	r (kgs²/m⁴)	g (kg/m⁴)	d	I/S d	Vs	n*10⁶ (m²/s)
-1000	-3281	21,5	294,5	1,022	854,6	11619	1,124	0,137	1,347	1,099	0,957	344,2	13,4
-900	-2953	20,8	293,8	1,020	844,7	11484	1,111	0,136	1,335	1,089	0,958	343,9	13,5
-800	-2625	20,2	293,2	1,018	835	11351	1,098	0,134	1,322	1,079	0,962	343,5	13,6
-700	-2297	19,5	292,5	1,015	825,3	11220	1,085	0,133	1,310	1,069	0,967	343,1	13,7
-600	-1969	18,9	291,9	1,013	815,7	11090	1,073	0,132	1,297	1,058	0,971	342,7	13,8
-500	-1640	18,2	291,2	1,011	806,2	10960	1,060	0,131	1,285	1,048	0,976	342,4	13,9
400	-1312	17,6	290,6	1,009	796,8	10832	1,048	0,129	1,273	1,039	0,981	342	14,0
300	-984	16,9	289,9	1,006	787,4	10705	1,036	0,128	1,261	1,029	0,985	341,6	14,1
200	-656	16,3	289,3	1,004	779,2	10580	1,024	0,127	1,249	1,019	0,990	341,2	14,3
100	-328	15,6	288,6	1,002	769,1	10455	1,011	0,126	1,237	1,009	0,995	340,9	14,4
0	0	15	288	1	760	10332	1	0,125	1,225	1	1	340,5	14,5
100	328	14,3	287,3	0,997	751,0	10210	0,988	0,123	1,213	0,990	1,004	340,1	14,6
200	656	13,7	286,7	0,995	742,2	10089	0,976	0,122	1,202	0,980	1,009	339,7	14,7
300	984	13,0	286,0	0,993	133,4	9970	0,964	0,121	-1,191	0,971	1,014	339,3	14,8
400	1312	12,4	285,4	0,991	724,6	9852	0,953	0,120	1,179	0,962	1,019	338,9	14,9
500	1640	11,1	284,7	0,988	716,0	9734	0,942	0,119	1,167	0,952	1,024	338,5	15,1
600	1969	11,1	284,1	0,986	707,4	9617	0,930	0,117	1,156	0,943	1,029	338,1	15,2
700	2297	10,4	283,4	0,984	699,0	9503	0,919	0,116	1,145	0,934	1,034	337,8	15,3
800	2625	9,8	282,8	0,981	690,6	9389	0,908	0,115	1,134	0,925	1,039	337,4	15,4
900	2953	9,1	282,1	0,979	682,3	9276	0,897	0,114	1,123	0,916	1,044	337	15,5
1000	3281	8,5	281,5	0,977	674,1	9165	0,887	0,113	1,112	0,907	1,049	336,6	15,7
1100	3609	7,8	280,8	0,975	665,9	9053	0,876	0,112	1,101	0,898	1,055	336,2	15,8
1200	3937	7,2	280,2	0,972	657,9	8944	0,865	0,111	1,090	0,889	1,060	335,8	15,9
1300	4265	6,5	279,5	0,970	649,9	8835	0,855	0,110	1,079	0,880	1,065	335,4	16,0
1400	4593	5,9	278,9	0,968	642,0	8728	0,844	0,109	1,069	0,872	1,070	335	16,2
1500	4921	5,2	278,2	0,966	634,2	8621	0,834	0,107	1,058	0,863	1,076	334,7	16,3
1600	5249	4,6	277,6	0,963	626,4	8516	0,824	0,106	1,048	0,855	1,081	334,3	16,4
1700	5577	3,9	276,9	0,961	618,7	8412	0,814	0,106	1,037	0,846	1,086	333,9	16,6
1800	5905	3,3	276,3	0,959	611,2	8309	0,804	0,104	1,027	0,838	1,092	333,5	16,7
1900	6234	2,6	275,6	0,957	603,7	8207	0,794	0,103	1,017	0,829	1,097	333,1	16,9
2000	6562	2	275	0,954	596,2	8106	0,784	0,102	1,006	0,821	1,103	332,7	17,0
2100	6890	1,3	274,3	0,952	588,8	8005	0,774	0,101	0,996	0,813	1,108	332,3	17,1
2200	7218	0,7	273,7	0,950	581,5	7906	0,765	0,100	0,986	0,805	1,114	331,9	17,3
2300	7546	0,0	273,0	0,948	574,3	7808	0,755	0,099	0,976	0,797	1,120	331,5	17,4
2400	7874	-0,6	272,4	0,945	576,2	7710	0,746	0,098	0,967	0,789	1,125	331,1	17,6
2500	8202	-1,2	271,7	0,943	560,1	7614	0,736	0,097	0,957	0,781	1,131	330,7	17,7
2600	8530	-1,9	271,1	0,941	553,1	7519	0,727	0,096	0,947	0,773	1,137	330,3	17,9
2700	8858	-2,5	270,4	0,939	546,1	7425	0,718	0,095	0,937	0,765	1,143	329,9	18,0
2800	9186	-3,2	269,8	0,936	539,3	7332	0,709	0,094	0,928	0,757	1,149	329,6	18,2
2900	9514	-3,8	269,1	0,934	532,5	7239	0,700	0,093	0,918	0,749	1,154	329,2	18,3

System warnings and errors

AIRCRAFT	
Warnings	**Pilot action**
BATTERY 1/2 OVERTEMPERATURE	- **Reduce power** - **Monitor battery temperature** - **Abort mission if necessary**
BATTERY SOC < 10%	- **Throttle idle** - **Abort mission (battery will disconnect by itself, depends on the cell voltage)**
Errors	**Pilot action**
ONLY ONE BATTERY PACK IS ACTIVE	This error appears when inverter is ON and when motor RPM exceeds 300. - **Do not take-off**
BATTERY 1/2 DISCONNECTED DUE TO [OVERCURRENT WHILE CHARGING, OVERTEMPERATURE, CONNECTOR DISCONNECT, CELL UNVERVOLTAGE, CELL OVERVOLTAGE]	Errors OVERTEMPERATURE, OVERCURRENT WHILE CHARGING and CELL UNDERVOLTAGE only appear while flying. - **Reduce power immediately (battery will disconnect by itself)**
BATTERY 1/2 STARTUP FAILED CODE: X	This error appears after turning the power enable switch on during ground operation. »X« represents the error number. - **Do not take-off** - **Note the number** - **Report error number to technical support** at maintainance@pipistrel.si
DRIVE OVERTEMPERATURE	This error appears when maximum inverter or motor temperature is exceeded. - **Reduce power** - **Monitor temperature** - **If the temperature doesn`t drop abort mission**
DRIVE TEMPERATURE SENSOR FAILURE	**WARNING!!! The inverter may reduce power to 0 if and when sensor failure happens.** - **Reduce power** - **Abort mission**
DRIVE COMMUNICATION FAILURE	The error only appears during ground operation. - **Abort mission (in this case the start-up is not possible)**
COOLANT SENSOR FAILURE	- **Reduce power** - **Abort mission**
DC/DC COMMUNICATION FAILURE	- **Abort mission**
DC/DC MALFUNCTION	- **Abort mission**
DC/DC NOT WORKING	This error appears when motor RPM exceeds 300. - **Abort mission**
POWER LEVER COMMUNICATION FAILURE	When this error appears the power setting will stay on the last value. - **Look for somewhere to land** - **As soon as the landing spot is within the glide cone, pull out the PWR CTRL circuit breaker and land**
DRIVE AUX POWER FAILURE	When this error appears, the motor and inverter don`t have power. This error only appears during ground operation. - **Abort mission**
PUMP AUX POWER FAILURE	This error indicates water pump failure and only appears during ground operation. - **Abort mission**

CHARGER	
Errors	**Pilot action**
CONNECTOR UNLOCK FAILURE	- **Abort charging** - **Contact technical support at** maintainance@pipistrel.si
BALS UNLOCK FAILURE	When this error appears, the cable between the charger and the power source not plugged in properly. - **Disconnect and re-connect the charging cable**
POWER STAGE BOOT FAILURE	- **Contact technical support at** maintainance@pipistrel.si
POWER STAGE INPUT VOLTAGE FAILURE	- **Abort charging** - **Contact technical support at** maintainance@pipistrel.si
TC NOT PRESENT	This error appears when the TC charging module isn't working. - **Contact technical support at** maintainance@pipistrel.si
RELAY TURN ON FAILURE	- **Contact technical support at** maintainance@pipistrel.si
RELAY TURN OFF FAILURE FAILURE	- **Contact technical support at** maintainance@pipistrel.si
BATTERY VOLTAGE DETECTION FAILURE	- **Contact technical support at** maintainance@pipistrel.si
COMMUNICATION FAILURE	- **Abort charging** - **Contact technical support at** maintainance@pipistrel.si
EA LOCK FAILURE	When this error appears, the cable between the aircraft and the charger is not plugged in properly. - **Disconnect and re-connect the charging cable**
BATTERY ACTIVATION FAILURE	- **Abort charging** - **Contact technical support at** maintainance@pipistrel.si
CHARGING RELAY FAILURE	- **Abort charging** - **Contact technical support at** maintainance@pipistrel.si
UNSUPPORTED BATTERY TYPE	- **Abort charging** - **Contact technical support at** maintainance@pipistrel.si

Abbreviations legend

PRS	- Parachute rescue system
SOC	- State of charge
SOH	- State of health
RPM	- Revolutions per minute
m	- Meters
ft	- Feet
kg	- Kilogram
km/h	- Kilometers per hour
kts	- Knots
MTOM	- Maximum takeoff mass
POH	- Pilot's operating handbook
sqft	- Square feet
V	- Volt
kW	- Kilowatt
kWh	- Kilowatt hour
BMS	- Battery management system
ELT	- Emergency locator transmitter
AC	- Anti-collision
NAV	- Navigation
LDG	- Landing gear
IFR	- Instrument flight rules
VFR	- Visual flight rules
IMC	- Instrument meteorogical conditions
MAC	- Mean aerodynamic chord
IAS	- Indicated airspeed
COM	- Communication
PWR	- Power

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Warranty statement/voids

For applicable warranty terms and conditions please refer to www.pipistrel.si.

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