# Airplane Manual

## FK 9 Mark IV

Certified as Light Sport Aircraft

This manual must be carried in the aircraft at all times.

This is the Pilot's operating manual and approved flight manual.

Serial Nr.: _____

Manual Nr.:
9-_____-1LSA

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FK Lightplanes

## REVISIONS

The following table contains a list of valid pages. This table will be updated with every revision. The pilot is responsible for keeping all pages of this manual to the revision status indicated in the table, by exchanging the relevant pages when a new revision has been published.
For updates check the homepage of FK Lightplanes under www.fk-lightplanes.com or www.flugservice-speyer.de regularly. New revisions can be downloaded there. If you do not have an internet connection, revisions can be ordered from FK Lightplanes.
Revisions and Service Bulletins for the ROTAX engine are available on www.rotax-aircraft-engines.com .

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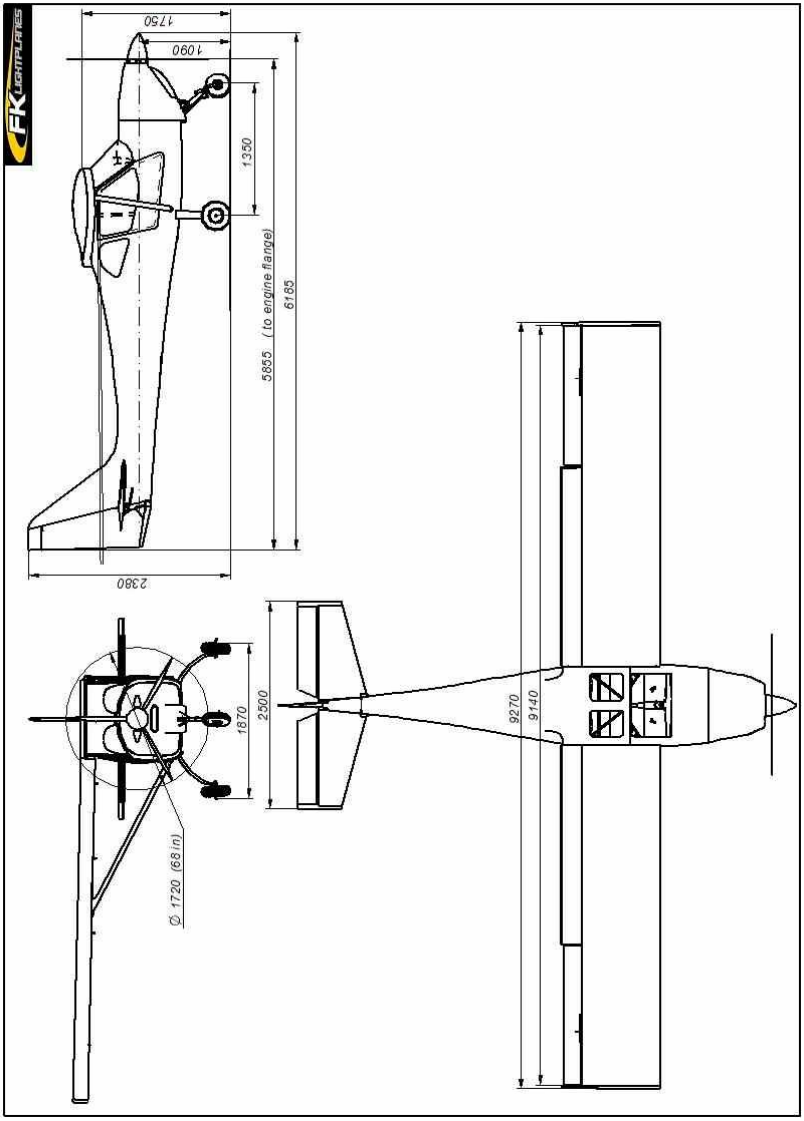
# 1. General

This manual must be read carefully by the owner and operator in order to become familiar with the operation of the FK 9. The manual presents suggestions and recommendations to help obtain safe and maximum performance without sacrificing economy.
The owner and operator should also be familiar with the applicable aviation regulations concerning operation and maintenance of this airplane.
All limits, procedures, safety practices, servicing, and maintenance requirements contained in this manual are considered mandatory for the continued airworthiness of the airplane.
All values in this manual are based on ICAO Standard Atmosphere conditions and maximum takeoff weight (MTOW).
The pilot in command has to make sure that the airplane is airworthy and operated according to this manual.

Non-compliance with handling, maintenance and checking instructions as indicated in the flight and maintenance manuals as well as the respective updates which are published in the manufacturer's website, will void warranty and/or guarantee claims.
The FK 9 SW (shortwing) is a variant with less wingspan.
All variants of airframes and powerplants can be combined as certified.

## 1.1. Airplane Three Side View



## 1.2. Technical Data (FK 9 Mk IV SW)

| | | | |
|---|---|---|---|
| Wing span: | 9,25m / 30,35 ft | Length: | 5,94m / 19,49 ft |
| Wing area: | 10,73m / 115,50 sqft | Height: | 2,41m / 7,91 ft |

## 1.3. Abbreviations and Terminology

**a) Speeds**

| | |
|---|---|
| IAS | Indicated airspeed = speed as shown on the airspeed indicator |
| CAS | Calibrated Airspeed is the indicated airspeed, corrected for position and instrument error. CAS is equal to TAS in standard atmosphere at sea level |
| TAS | True airspeed = speed relative to undisturbed air |
| VA | Maneuvering speed = max. speed at which application of full available aerodynamic control will not overstress the airplane |
| VNE | Never exceed speed is the speed limit that must not be exceeded at any time |
| VNO | Maximum structural cruising speed is the speed that should not be exceeded except in smooth air and only with caution |
| VFE | Maximum Flap extended Speed is the highest speed with wing flaps in a prescribed extended position |
| VS | Stalling speed or the minimum steady flight speed at which the airplane is controllable |
| VSO | Stalling speed in landing configuration (full flaps) |
| VX | Best angle of climb speed which delivers the greatest gain of altitude in the shortest possible horizontal distance |
| VY | Best rate of climb speed which delivers the greatest gain of altitude in the shortest possible time |

**b) Meteorological**

| | |
|---|---|
| ISA | International Standard Atmosphere: OAT in MSL 15°C; pressure in MSL 1013,2hPa; air a perfect dry gas; temperature gradient of 0,65°C per 100m |
| MSL | Mean sea level |
| OAT | Outside air temperature |

**c) Weight and Balance**

| | |
|---|---|
| Reference Datum | An imaginary vertical plane from which all horizontal distances are measured for balance purposes |
| Arm | The horizontal distance from the reference datum to the center of gravity of an item |
| Moment | The product of the weight of an item multiplied by its arm |
| Airplane center of gravity (C.G.) | The point at which an airplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane |
| C.G. arm | The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight |
| C.G. limits | The extreme center of gravity locations within which the airplane must be operated at a given weight |
| Empty weight | Weight of the airplane including unuseable fuel, full operating fluids and full oil; equipment as indicated |

**d) Conversions**

| | | | | | |
|---|---|---|---|---|---|
| 1 Liter (Ltr) | = | 0,264 USG | 1 USG | = | 3,785 Ltr |
| 1 m | = | 3,28 ft | 1 ft | = | 0,3048 m |
| 1 km/h | = | 0,54 kt | 1 kt | = | 1,852 km/h |
| 1 cm | = | 0,394 inch | 1 inch | = | 2,54 cm |
| 1 bar | = | 14,5 psi | 1 psi | = | 0,069 bar |
| 1 kg | = | 2,2 lbs | 1 lbs | = | 0,45 kg |

# 2. Limitations

## 2.1. General

This chapter contains limitations, instrument markings and placards required for the safe operation of the aircraft.
Limitations valid for additional equipment can be found in chapter 9 (supplements).

## 2.2. Airspeed Limitations

The airspeed limitations (CAS) are based on a weight of 1147 lbs (520 kg), 1190 lbs (540kg), respectively 1235 lbs (560kg) for the aircraft equipped with floats:

| | 520kg / 1147 lbs | 540kg / 1190 lbs | 560kg / 1235 lbs |
|---|---|---|---|
| $V_{NE}$ : | 230 km/h / 124 kt | 220 km/h / 119 kt | 220km/h / 119 kt |
| $V_{NO}$ : | 184 km/h / 99 kt | 184 km/h / 99 kt | 172 km/h / 93 kt |
| $V_A$ : | 166 km/h / 90 kt | 166 km/h / 90 kt | 172 km/h / 93 kt |
| (Flaps 1) $V_X$ : | 100 km/h / 54 kt | 105 km/h / 57 kt | 105 km/h / 57 kt |
| (Flaps up) $V_Y$ : | 115 km/h / 62 kt | 130 km/h / 70 kt | 130 km/h / 70 kt |
| CWC: | 27 km/h / 15 kt | | |
| w/o door | 100 km/h / 54 kt | | |
| $V_{FE}$ | 113 km / 61 kt | 115 km/h / 62 kt | 117 km/h / 63 kt |
| $V_{S\ clean}$ | 78 km/h / 42 kt | 81 km/ h / 44 kt | 81 km/h / 44 kt |
| $V_{S0}$ | 67 km/h / 36 kt | 70 km/h / 38 kt | 72 km/h / 39 kt |

***with Junkers Rescue System installed $V_{NE}$ : 215 km/h 116 kt***

## 2.3. Airspeed Indicator Markings

The airspeed indicator has following markings and shows CAS in [km/h / kt]:

| | **520 kg<br>1147 lbs** | **540 kg<br>1190 lbs** | **560 kg<br>1235 lbs** |
|---|---|---|---|
| white arc: 1,1*VSO to VFE<br>full flap operating range | 74 - 113 km/h<br>40 to 61 kt | 77 - 115 km/h<br>42 to 62 kt | 79 - 117 km/h<br>43 to 63 kt |
| green arc: 1,1*VS1 to VNO<br>normal operating range<br>(flaps up) | 86 - 184 km/h<br>46 to 99 kt | 89 - 184 km/h<br>48 to 99 kt | 89 - 172 km/h<br>48 to 93 kt |
| yellow radial: at VA<br>maneuvering speed | 166 km/h<br>90 kt | 166 km/h<br>90 kt | 172 km/h<br>93 kt |
| yellow arc: VNO to VNE<br>operate with caution, only<br>in smooth air | 184 - 230 km/h<br>99 to 124 kt | 184 - 220 km/h<br>99 to 119 kt | 172 - 220 km/h<br>93 to 119 kt |
| red radial: at VNE<br>max. speed for all ops. | 230 km/h<br>124 kt | 220 km/h<br>119 kt | 220 km/h<br>119 kt |

## 2.4. Power Plant Limitations

This is summary of the respective engine manual. In case of any discrepancy the engine manual shall apply.

| | **ROTAX 912 ULS** |
|---|---|
| **Oil** | automobile - oil (API SF or SG) |
| **Oil level** | 2,6 Ltr / 2,76 quarts (min) to 3,05 Ltr / 3,24 quarts (max |
| **Oil temperature** | min 122°Fm (50°C)<br>max. 130°C / 266° |
| **Oil pressure** | 1,5 bar / 22 psi to 5 bar / 73 psi<br>(cold engine start up to 7 bar / 101 psi |
| **Fuel** | car fuel without bioethanol (min 95 RON)<br>MOGAS, AVGAS 100LL |
| **Fuel pressure** | 0,15 bar / 2,2 psi to 0,4 bar / 5,8 psi |
| **CHT** | max. 120°C / 248°F<br>when using water / glycol mixture |

**Note:**
Following SB-912-036R1 has been issued for all ROTAX 912A / 912F / 912S / 914F engines:
Subject: Oil system, Engine lubrication system
Engines which have had the prop spun for more than 1 turn in reverse direction allow air to be injested into the valve train.
Action:

1. It is forbidden to spun the prop in reverse direction for more than 1 turn.
2. Inspection for correct venting of the oil system has to be performed in cases when the prop has been spun in reverse direction for more than 1 turn.

## 2.5. Propeller

| Engine | Propeller | Diameter |
|---|---|---|
| ROTAX 912 ULS | Sport Prop Klassik 3 blade | 1,71 m / 67 inch |
| ROTAX 912 ULS | Warp / DUC 3 – blade | 1,72 m / 68 inch |
| ROTAX 912 ULS | DUC FC 3 - Blatt | 1,72 m / 68 inch |

## 2.6. Weights

| | | | |
|---|---|---|---|
| Empty weight: | acc. actual weighing | | |
| Maximum weight per seat: | 220 lbs | 100 kg | |
| Baggage aft max: | 22 lbs | 10 kg | |
| Total of fuel + baggage max.: | 103 lbs | 46,5 kg | |
| | | | floatplane |
| Max. Takeoff / Landing Weight: | 520 kg | 540 kg | 560 kg |
| (depending on country rules) | 1147 lbs | 1190 lbs | 1235 lbs |

## 2.7. C.G. Limits

| | |
|---|---|
| forward center of gravity: | 8,7 inch (0,22 m) behind datum |
| aft center of gravity | 17,3 inch (0,44 m) behind datum |

Datum is the leading edge of the wing.
For weighing, the firewall has to be in the vertical position.

## 2.8. Maneuvers

The FK 9 is an approved Light Sport Aircraft (LSA), (in USA according FAA S-LSA).
Acrobatic maneuvers, including spins, bank angles greater than 60°, as well as IFR are prohibited.
*Note regarding spins: In the light sport aircraft category spinning is strictly prohibited and is not required to demonstrate during flight test program.*
*Despite this, all FK aircraft have also been tested regarding their general spin characteristics. In general it is important to know that a spin is a very complex flight condition and relates to many individual factors like operation weight, centre of gravity, mass distribution, aerodynamic conditions, number of spin turns already performed, kind of control deflections already made and so on.*
*For example, the spinning characteristic of the same aircraft on the same day can differ significantly because of differences in mass distribution or dirt on surfaces. This can cause a "non recoverable" spin-condition!*
*In practice this means that flying into stalls on purpose must be avoided and recovery procedures have to be performed immediately!*

*Spinning any aircraft which is not certified for this maneuver is extremely dangerous! The onset of a stall is indicated to the pilot by many factors like IAS, stick pressure, horizon level. Stalls can also be result from abrupt control deflections/changes in angle of attack!*
In strong turbulence the airspeed must be reduced below $V_A$.

When flying off grass strips with long grass, the wheel pants must be removed to avoid damage.
When flying with doors removed, maximum speed is 54 kt. Flight with door open is prohibited.
Maneuvers with zero or negative load factors must be avoided under all conditions. These maneuvers may cause a fire due to fuel spill when using ROTAX engines with carburetors.

## 2.9. Flight Load Factors

| | positive | negative |
|---|---|---|
| Maximum load factor at $V_A$ | + 4g | - 2g |
| Maximum load factor at $V_{NE}$ | + 4g | - 1,5g |
| Maximum load factor with flaps down | + 2g | 0g |

## 2.10. Kind of Operation

The FK 9 is approved as Light Sport Aircraft for daytime VFR.

## 2.11. Fuel / Oil / Coolant

Engine operating manual is the governing one!

| | |
|---|---|
| **Tank** | Capacity 15,8 USG (60 liter); 0,26 USG (1 liter) not useable<br>optional additional wingtanks 2 x 20 Ltr (2 x 5,28 USG),<br>2 Ltr (0,53 USG) each tank not useable |
| **Fuel** | Compare engine limitations<br>Unleaded fuel without bioethanol recommended<br>AVGAS should only be used if MOGAS is not available or in case of problems caused by vapour locks |
| **Oil** | Compare engine limitations<br>synthetic oils preferred; *do not use aircraft oil !* |
| **Oil capacity** | Compare engine limitations |
| **Coolant** | Compare engine limitations |

## 2.12. Passenger Seating

The aircraft has 2 seats. It can be flown from either seat.

## 2.13. Colour

The surface of the structure (composite structure) must be white or yellow. Local coloured decoration is possible. Complete painting in different colours only with agreement of the manufacturer.

## 2.14. Electric

The electrical system is designed for a maximum load of 12 A.

## 2.15. Placards

| **Location:** | **Placard:** |
|---|---|
| In the Cockpit | max. TOW _____lbs<br>spins and acrobatics prohibited |
| Cockpit | Weighing date:<br>Empty weight:<br>Poss. load including fuel: |
| Cockpit rear section | Type placard (metal) |
| Door handles (inside + outside) | OPEN / CLOSE |
| Fuel selector in flow direction | fuel |
| Fuel selector closed position | close |
| Aft baggage compartment | max. load 6,6 lbs (3 kg) with full fuel |
| Choke (ROTAX only) | choke |
| Carburetor heat | carb. (option) |
| Cabin heat | cabin heat (option) |
| Throttle friction | throttle friction |
| Trim handle | trim |
| Trim markings | Neutral; nose up; nose down |
| Park brake valve | Park |
| Brake handle | Brake |
| Flap indication | close to indication LED |
| Oil temperature indication VDO | OIL |
| CHT indication VDO | CHT |
| Fuel cap | FUEL AVGAS / MOGAS |
| Fuel indication | markings every 2 USG + tank full |
| Vicinity of rescue system | placard Rescue system |
| Rocket Exit Area | Danger: Rocket Exit Area |
| safety pin rescue system | Remove before flight |
| Top of vertical fin | Company logo |
| Wing tip (ext. wing connection mechanism installed) | OPEN / CLOSE |
| Wheel fairings main wheels | 29 psi (2,0 bar) |
| Wheel fairing nose wheel | 22 psi (1,5 bar) |
| **Towing version only:** | |
| Vicinity of airspeed indicator | Care for tow speed ! |
| Handle for cowlflap | Cowlflap |
| Towing clutch | max. break load 200kp |
| Handle for towing clutch | TOW |

# 3. Emergency Procedures

## 3.1. General

The following information is presented to enable the pilot to form, in advance, a definite plan of action for coping with the most probable emergency situations which could occur in the operation of the airplane.

## 3.2. Engine Failure

| | |
|---|---|
| Glide speed | 105 km/h / 57kt flaps pos. 1 |
| Electrical fuel pump | ON |
| Fuel selector | check ON |
| Fuel remaining | check level |
| Engine | start |
| **No restart possible:** | |
| Emergency landing | perform respective procedure |

## 3.3. Fuel Pressure Low

In the event of a fuel pressure low indication, switch ON the electrical fuel pump. Select fullest tank (Wingtank only).

## 3.4. Generator Fault

In the event of a power generator fault, switch OFF all non-essential devices in order to save battery power.

## 3.5. Glide

Glide ratio is about 1:8,5 for best glide speed 105 km/h / 57 kt (flaps pos. 1).

## 3.6. Emergency Landing

| | |
|---|---|
| Glide speed | 105 km/h / 57 kt flaps pos. 1 |
| Emergency field | select |
| Emergency call (121,5 MHz) | perform |
| Throttle | close |
| Electrical fuel pump | OFF |
| Fuel selector | OFF |
| Ignition / Battery switch | OFF |
| Safety belts | pull tight |
| **Final, landing assured:** | |
| Flaps | full down |
| Approach speed | 95 km/h / 51 kt |

The glide can be controlled by changing airspeed, flap setting or slip. Use caution, flaps in position 2 cause a lot of drag. Airspeed indication remains valid during slip. Touchdown should be achieved at minimum speed.

## 3.7. Strong Vibrations

| | |
|---|---|
| **Caused by engine or propeller:** | |
| Ignition | OFF |
| Airspeed | reduce |
| Emergency landing | perform respective procedure |
| **Caused by the fuselage / wings:** | |
| Airspeed | reduce |

## 3.8. Steering Problems

| | |
|---|---|
| **Aircraft uncontrollable with remaining flight controls:** | |
| Throttle | close |
| Ignition | OFF |
| Rescue system | activate |
| Electrical fuel pump | OFF |
| Fuel selector | OFF |
| Emergency call (121,5 MHz) | perform |
| Battery switch | OFF |
| Safety belts | pull tight |
| Doors | unlatch |

## 3.9. Fire and Smoke

| | |
|---|---|
| All electrical systems | OFF |
| Landing | as soon as possible; if required, perform emergency landing |
| Rescue system | activation only, if immediate emergency landing not possible |

## 3.10. Stall recovery

A stall can be recognized by light buffeting.

| | |
|---|---|
| Elevator | push |
| Wings | level |
| Aircraft | recover |

Normally the FK 9 does not enter a spin out of a slowly initiated stall.
**Spin recovery (if a spin is entered inadvertently):**

| | |
|---|---|
| Stick | neutral |
| Full rudder | opposite to direction of spin |
| Flaps | up |
| Wings | level |
| Aircraft | recover |

To avoid overstressing the flaps, they must be retracted immediately.

**Stalls (especially with power on), spins and all maneuvers with zero or negative g-load must be avoided under all circumstances, these maneuvers may cause a fire, especially when using ROTAX engines with carburetors.**

**For all other emergencies use standard procedures!**

# 4. Normal Procedures

## 4.1. General

This chapter deals with the normal procedures recommended for the safe operation of the FK 9.

## 4.2. Regular Inspection

As light sport aircraft are designed to be lighter than normal aircraft but must withstand similiar loads, the structure and the engine must be inspected regularly.
If there is any damage it is recommended to consult a certified maintenance facility or contact the manufacturer. This applies especially to the composite and aluminium structures.

## 4.3. Preflight Inspection

During preflight inspection, the aircraft must be inspected for its general condition. Snow, ice, frost and dirt must be removed completely from the aircraft as they impair aerodynamics and also increase weight.

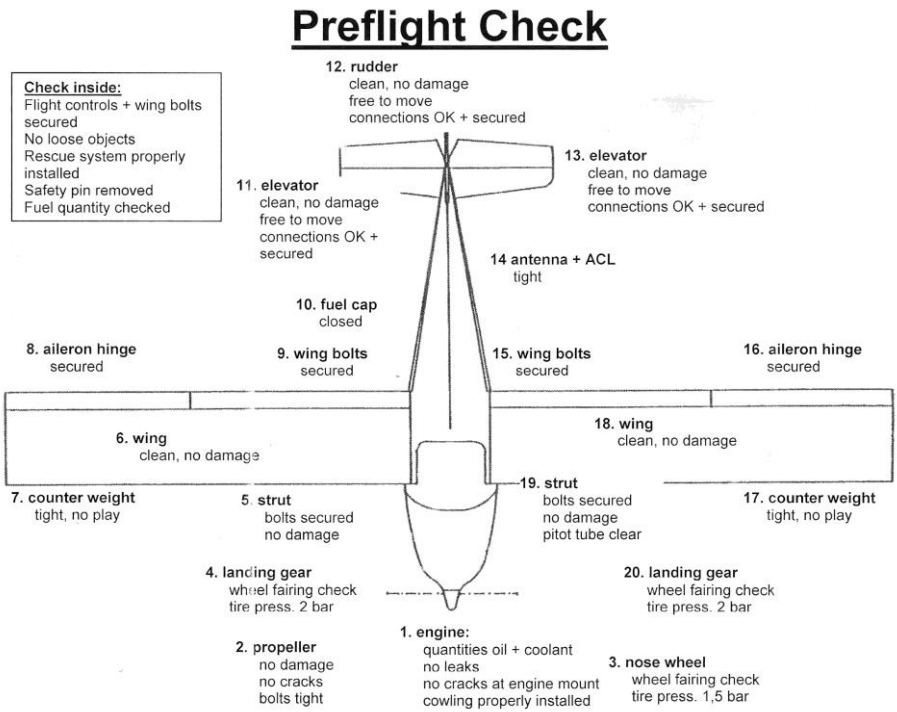
| **Preparation** | |
|---|---|
| Aircraft condition | Airworthy, papers available |
| Weather | Sufficient |
| Baggage | Weighted and safely stowed |
| Weight and balance | Checked |
| Navigation and charts | Prepared and available |
| Performance and endurance | Calculated and safe |

| **Cockpit** | |
|---|---|
| Battery / ignition | OFF |
| Cabin | no loose objects |
| Flight controls | connected and secured |
| Belts, seats | check |
| Fuel quantity | check |
| Fuel lines, tank mounting | check |
| Rescue system | remove safety pin |
| Instruments | check |

| **Engine check (also perform the checks required as mentioned in the engine manual)** | |
|---|---|
| Cowling | remove |
| Exhaust | check for cracks + check springs |
| Carburetor, accessories | check |
| Coolant | check, add if required |
| Oil quantity | check, add if required |
| Oil-, cooling- and fuel system | check for leaks |
| Spark plugs | check |
| Engine mount | check for cracks |
| Vibration damper | check for cracks |
| Fuel lines | check for damage |
| Cables, bowden-cables | check for damage |
| Float chamber (carburetor) | check for water / dirt |
| Cowling | install |

| **Outside check**<br>Wings, fuselage and rudder must be checked for damage. In cold and moist weather conditions the ceconite can loose tension. If there is no structural damage it can be carefully treated with a hair dryer to bring up the tension. | |
|---|---|
| 1. Engine | perform check as prescribed above |
| 2. Propeller | no damage,cracks |
| 3. Nose wheel | wheel fairings check; tire press. 22 psi (1,5bar) |
| 4. Right landing gear | wheel fairings check; tire press. 29 psi (2 bar); check main attachment screws |
| 5. Right strut | bolts secured, no damage |
| 6. Right wing | clean, no damage |
| 7. Counter weight | tight, no play |
| 8. Aileron hinge | secured |
| 9. Wing bolts | secured |
| 10. fuel cap | closed |
| 11. Right elevator | clean, no damage, freedom of movement; connections OK + secured |
| 12. Rudder | clean, no damage, freedom of movement; connections OK + secured |
| 13. Left elevator | clean, no damage, freedom of movement; connections OK + secured |

| | |
|---|---|
| 14. Antenna + ACL | tight |
| 15. Wing bolts | secured |
| 16. Aileron hinge | secured |
| 17. Balance weight | tight, no play |
| 18. Left wing | clean, no damage |
| 19. Left strut | bolts secured, no damage; pitot tube clear, cover removed |
| 20. Left landing gear | wheel fairings check; tire press. 29 psi (2 bar); check main attachment screws |
| **Tail wheel only** | |
| tailwheel | Wheel OK; connection OK + secured |



## 4.4. Engine Start

| | |
|---|---|
| Seat belts | fastened |
| Doors | closed and locked |
| Fuel selector | OPEN |
| All electrical equipment | OFF |
| Circuit breaker | check |
| Instruments | check |
| Rescue system | check safety pin removed |
| Battery switch | ON |
| Ignition | ON |
| Electrical fuel pump | ON |
| Choke (ROTAX only) | pulled (cold engine only) |
| Parking Brake | set |
| Throttle | idle (**hot engine ½ throttle!**) |
| Prop area | CLEAR |
| Starter | engage; set 1600 - 1700 RPM |
| Oil pressure | check |
| Choke (ROTAX only) | OFF |
| Avionics | ON |
| Electrical fuel pump | OFF |

## 4.5. Taxi

| | |
|---|---|
| Brakes | check |
| Stick | pull to relieve nosewheel |
| Rudder | do not move if aircraft is not moving |
| **Tail wheel only:** | |
| Stick | push to relieve tailwheel |

## 4.6. Before Take-off

| | |
|---|---|
| Brakes | set;<br>brakes must hold at least 3200 RPM |
| Instruments | check |
| Choke (ROTAX only) | check OFF |
| Magnetos (ROTAX only) | check at min. 2800 RPM; variance between mags. max. 115 RPM, max. drop 300 RPM |
| Electrical fuel pump | ON |
| Flaps | takeoff position (Pos. 0 or 1) |
| Flight controls | check |
| Trim | takeoff position |
| Doors | closed and locked; end of seatbelts inside the cockpit |
| Oil temperature | min. 122°F (50°C) |
| CHT | min. 140°F (60°C) |

## 4.7. Takeoff

| | |
|---|---|
| Brakes | Apply |
| Carburetor heat | cold (if installed) |
| Throttle | advance slowly to full power |
| Engine instruments | check, min. 4500 RPM |
| Brakes | Release |
| Elevator | Neutral |
| at 54 kt | lift off |
| Climb | 105 km/h / 57 kt with flaps in Pos. 1<br>130 km/h / 70 kt with flaps in Pos. 0 |
| **Clear of obstacles, at safe altitude:** | |
| Flaps | up |
| Electrical fuel pump | OFF |

It is not recommended to takeoff with full flaps as the flaps produce a lot of drag in this position.

## 4.8. Climb

| | |
|---|---|
| Oil temperature ROTAX | max. 266°F (130°C) |
| CHT ROTAX | max. 248°F (120°C) |
| Speed | 130 km/h / 70 kt with flaps up |

**Hint:**
At CHT >239°F (115°C) local condensation in the cooling system will cause continuous loss of cooling fluid. Reduce power setting and increase airspeed until CHT remains below 239°F (115°C).

## 4.9. Cruise

| | |
|---|---|
| Oil temperature ROTAX | max. 266°F (130°C) |
| CHT ROTAX | max. 248°F (120°C) |
| Speed | as required |
| Trim | Set |
| Fuel | monitor |

For values of fuel flow and range check chapter 5.

## 4.10. Descent

| | |
|---|---|
| Carburetor heat | warm (if installed) |
| Oil temperature | min. 122°F (50°C) |
| CHT | min. 140°F (60°C) |

**Hint:**
If engine temperatures remain at or below minimum values during flight (winter operation), it is recommended to cover the radiators with tape.

## 4.11. Landing

| | |
|---|---|
| **Normal Landing** | |
| Speed | reduce to 112 Km/h / 60 kt |
| Flaps | set Pos. 1 |
| Speed | 112 km/h / 60 kt (rain + 5km/h / 3 kt) |
| Electrical fuel pump | ON |
| Short prior touchdown | start flare to achieve touchdown at minimum speed |
| Throttle | idle |
| **Tail wheel only** | |
| Touchdown | in 3 point position |
| Control stick | keep full aft after tail wheel is on the ground |
| **Short Field Landing** | |
| Speed | reduce to 112 Km/h / 60 kt |
| Flaps | set Pos. 1 |
| Electrical fuel pump | ON |
| On final | reduce speed to 102 km/h / 55 kt |
| flaps | set Pos. 2 |
| Speed | 95 km/h / 51 kt (rain + 5km/h / 3 kt) |
| Short prior touchdown (not to early!) | start flare to achieve touchdown at minimum speed |
| Throttle | Idle |
| **Tailwheel only** | |
| Touchdown | in 3 point position |
| Control stick | keep full aft after tailwheel is on the ground |
| **Go Around** | |
| Throttle | advance slowly to full power |
| Speed | min. 95 km/h / 51 kt |
| Flaps | retract to / maintain Pos. 1 |
| Carburetor heat | cold (if installed) |
| Speed | 105 km/h / 57 kt |
| Trim | set |
| **Clear of obstacles, at safe altitude:** | |
| Flaps | up |
| Electrical fuel pump | OFF |
| Speed | 130 km/h / 70 kt |

Under certain conditions (crosswind, turbulence, forward CG) it is recommended to retract flaps immediately after touchdown.

## 4.12. Touch and Go

| | |
|---|---|
| Flaps | retract to Pos. 1 |
| Carburetor heat | cold (if installed) |
| Trim | set takeoff position |
| Throttle | advance slowly to full power |
| at 100 km/h / 54 kt | rotate |
| Speed | 105 km/h / 57 kt |
| **Clear of obstacles, at safe altitude:** | |
| Flaps | Up |
| Electrical fuel pump | OFF |
| Speed | 130 km/h / 70 kt |

## 4.13. After Landing / Parking

| | |
|---|---|
| Flaps | Up |
| Trim | takeoff position |
| Carburetor heat | cold (if installed) |
| Electrical fuel pump | OFF |
| Avionics | OFF |
| Ignition | OFF |
| Battery switch | OFF |
| Rescue system | secure (insert safety pin) |

# 5. Performance

## 5.1. General

The graphs and tables in this section present performance information corrected for the conditions of ICAO Standard Atmosphere. These data do not contain any safety margin and are based on a clean and well serviced aircraft as well as the application of the mentioned procedures.

## 5.2. Takeoff Distance

Conditions: Mean sea level (MSL), no wind, dry grass surface, takeoff weight 540 kg / 1147 lbs, flaps pos. 1, $V_R$ 90 km/h / 49kt, Vx 105 km/h / 57kt.

| Propeller | Engine | Takeoff run | to 50 ft Height |
|---|---|---|---|
| Sportprop | ROTAX 912 ULS | 217 m / 541 ft | 391 m / 984 ft |
| Warp / Duc | ROTAX 912 ULS | 217 m / 541 ft | 391 m / 984 ft |
| Duc FC | ROTAX 912 ULS | 265 m/ 869 ft | 455 m / 1493 ft |

**Correction for differing conditions:**

Correct above mentioned values for differing conditions as follows:

| Difference in | Correction | m |
|---|---|---|
| 1. Pressure Altitude: | + 10% per 1000ft Pressure Altitude (PA) | +<br>= |
| 2. Temperature: | +/- 1% per°C temperature deviation | +/-<br>= |
| 3. Slope: | +/- 10% per 1% slope | +/-<br>= |
| 4. wet surface: | + 10 % | +<br>= |
| 5. soft surface: | + 50% | +<br>= |
| 6. high grass: | + 20% | +<br>= |

## 5.3. Climb Performance

at a weight of 540kg in ISA conditions

| speed / configuration | performance |
|---|---|
| Vx 105 km/h / 57 kt with flaps 1 | 3,8 m/s / 750 ft/min |
| Vy 130 km/h / 70 kt with flaps up | 4.16 m/s / 820 ft/min |

## 5.4. Cruise Performance

at a weight of 540 kg in ISA conditions, ROTAX 912S

| **Power** | **55% / 4300 RPM** | **65% / 4800 RPM** | **75% / 5000 RPM** |
|---|---|---|---|
| **CAS** | 170 km/h / 92kt | 190 km/h / 103kt | 200 km/h / 108kt |
| **fuel** | 14,5 l/h | 17,5 l/h | 18,5 l/h |

## 5.5. Service Ceiling

**Please observe Oxygen requirements and respect any local regulations and rules!**

The maximum Altitide in ISA conditions at a weight of 540 kg is:

| **Engine** | **ceiling** |
|---|---|
| ROTAX 912 UL | 14500ft = 4420m |
| ROTAX 912 ULS | 16000ft = 4877m |

## 5.6. Landing Distance

Conditions: Mean sea level (MSL), dry grass surface, no wind, landing weight 540 kg / 1190 lbs, flaps pos. 2, Vapp 95 km/h / 51kt, normal braking.

| **Landing distance from 15m / 50ft** | **ground roll** |
|---|---|
| 355 m / 1165 ft | 135 m / 443 ft |

**Correction for differing conditions:**

Correct above mentioned values for differing conditions as follows:

| **Difference in** | **Correction** | **m** |
|---|---|---|
| 1. Pressure Altitude: | + 5% per 1000ft Pressure Altitude (PA) | +<br>= |
| 2. Temperature: | +/- 0,5% per°C temperature deviation | +/-<br>= |
| 3. Slope: | +/- 10% per 1% slope | +/-<br>= |
| 4. wet surface: | + 15 % | +<br>= |
| 5. snow surface: | + 25% | +<br>= |
| 6. high grass: | + 20% | +<br>= |

# 6. Weight and Balance

## 6.1. General

To achieve the mentioned performance data and flying abilities, the aircraft must be operated within certified weight and balance limits. Although the aircraft has a wide range for weight and balance, it is not possible to fly with full baggage load, full fuel and 2 heavy pilots at the same time.
Wrong loading has consequences for every airplane:
an aircraft exceeding weight limits will need longer takeoff- and landing distances, climb performance will be decreased and stall speed increased.
A wrong center of gravity will change the flying abilities. A forward C.G. may cause problems during rotation, takeoff and landing. An aft C.G. may cause instability, inadvertent stall or even spin.
The pilot in command must assure prior to each takeoff, that the aircraft is operated within the certified weight and balance limits.

## 6.2. Basic Empty Weight

Prior to delivery, each aircraft has been weighted with fuselage level, (reference line see drawing below, firewall vertical), including oil and coolant, as well as equipment as indicated but no fuel (except un-drainable fuel). During this procedure the respective arms are determined as well.
By using the following formula, the C.G. is computed. Reference line (datum) for all arms is the leading edge of the wing. All these data are transferred to the Basic Empty Weight and Balance Form (Wägebericht). This "Wägebericht" contains a list of equipment installed and is part of this manual.
All changes to the airplane affecting weight and balance (installation of new equipment etc.) require a new weighing.

**Formula to compute the center of gravity (X):**

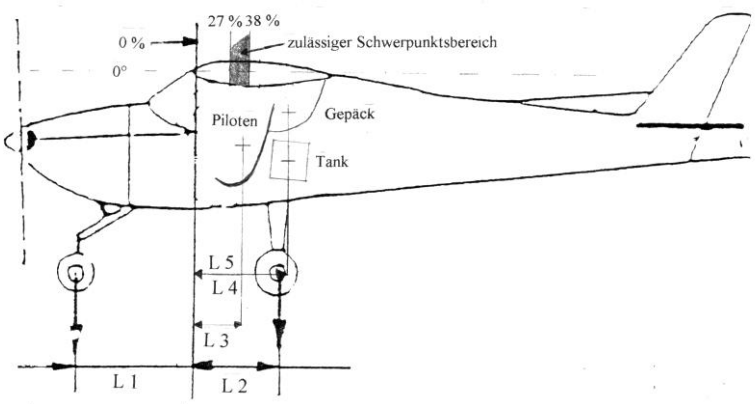
Center of Gravity in [inch] $CG = \frac{\sum M}{\sum G}$

TW = total weight
WF = weight front
WR = weight right
WL = weight left

$$X\,[inch] = \frac{-L1 \bullet WF + L2 \bullet (WR + WL)}{TW}$$ **Tricycle**

$$X\,[inch] = \frac{(WR + WL) \bullet L1 + WA \bullet L2}{TW}$$ **Tailwheel**

WA = weight aft




**Arms (Datum: wing leading edge):**

| | | | |
|---|---|---|---|
| L 1 nosewheel | Weight form | L 4 fuselage tank | 1,05m / 41,34 inch |
| L 2 wheel | Weight form | L 5 baggage | 1,19m / 46,85 inch |
| L 3 seat | 0,43m / 16,93 inch | L 6 wingtank | 0,21m / 8,27 inch |

For the tailwheel version, following applies:
L 1 = from datum to the axle of the main wheels
L 2 = from datum to the axle of the tailwheel

## 6.3. Determination of C.G. for the Flight

**The Pilot is responsible for proper loading of the aircraft.**
The C.G. can be determined by computation. The C.G. must always be within limits (compare chapter 2)!

Example for computation:
Data in the shaded area are taken from the “Wägebericht”.

| Position | Weight [kg] | Arm [m] | Moment [mkg] |
|---|---|---|---|
| Left wheel | WL = 120,1 | L 2 = 0,527 | 63,29 |
| Right wheel | WR = 119,1 | L 2 = 0,527 | 62,77 |
| Nose wheel | WF = 45,8 | L 1 =- 0,854 | - 39,11 |
| **Empty weight-data** | Empty weight **285** | C.G. **0,31** | **86,95** |
| Pilot(s) | 150 | L 3 = 0,43 | 64,5 |
| Fuel | 10 | L 4 = 1,05 | 10,5 |
| Fuel Wing | 0 | L 6 = 0,21 | 0 |
| Baggage | 5 | L 5 = 1,19 | 5,95 |
| **Total** | Total Weight **450** | C.G. (0,22 to 0,44) **0,373** | Total Moments **167,9** |

Form:

| Position | Weight [kg] | Arm [m] | Moment [mkg] |
|---|---|---|---|
| Left wheel | WL = _____ | L 2 = _____ | _____ |
| Right wheel | WR = _____ | L 2 = _____ | _____ |
| Nose wheel | WF = _____ | L 1 =-_____ | _____ |
| **Empty weight-Data** | Empty weight | C.G. | |
| Pilot(s) | _____ | L 3 = 0,43 | _____ |
| Fuel | _____ | L 4 = 1,05 | _____ |
| Fuel Wing | _____ | L 6 = 0,21 | _____ |
| Baggage | _____ | L 5 = 1,19 | _____ |
| **Total** | Total Weight | C.G. (0,22 to 0,44) | Total Moments |

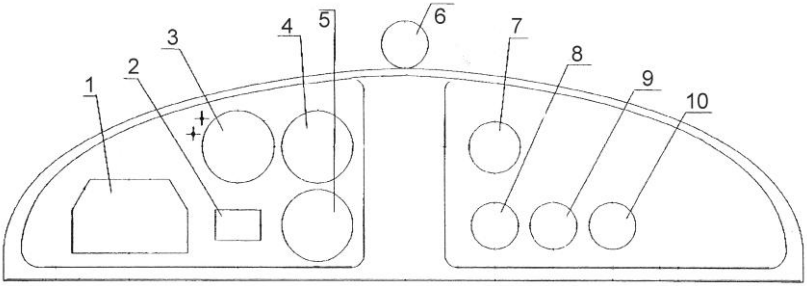
# 7. Systems Description

## 7.1. General

The FK 9 is a two-seat high wing aircraft with aerodynamic steering. It is available in tricycle or tailwheel configuration. The wing has flaps which can be set to three positions. The nosewheel / tailwheel is steerable and connected to the rudder pedals. The aircraft is equipped with dual controls.

## 7.2. Instrument Panel

The instrument panel contains all required flight and engine instruments. This describes a standard equipment configuration, different ooptions can be provided on request.

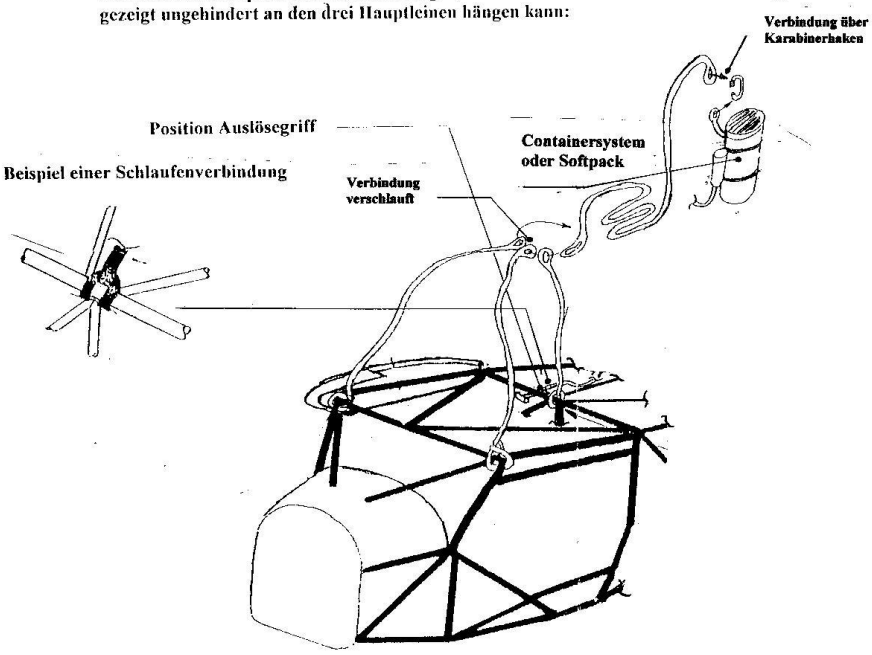



| | | | | | |
|---|---|---|---|---|---|
| 1 | Electric panel | 5 | Variometer | 9 | Oil temperature |
| 2 | Slip indicator | 6 | Compass | 10 | Cylinder Head Temperature |
| 3 | Speed indicator | 7 | RPM indicator | | |
| 4 | Altimeter | 8 | Oil pressure | | |

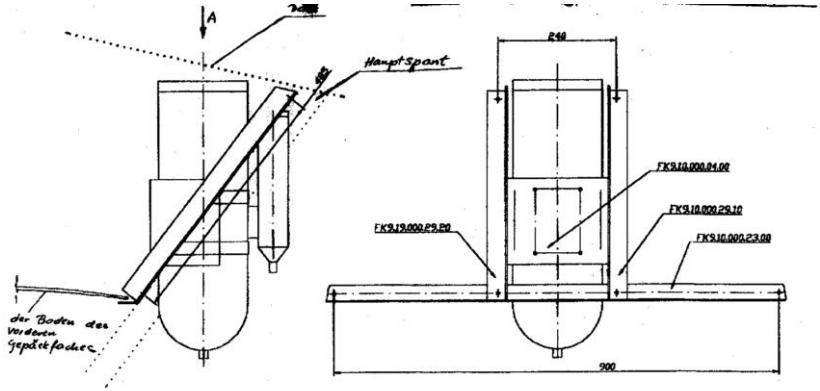
Controls to operate flaps, brakes and trim are located at the center console.

## 7.3. Rescue system

The FK 9 is equipped with a rescue system mounted into the fuselage behind the seats. Only original Kevlar harness parts must be used. There must be no obstructions for the deployment of the rocket.
Detailed information concerning max. speed, capacity and maintenance cycles are provided in the respective rescue system manual.



Canister system installation:




Softpack installation:


The system is activated by pulling the red handle overhead the pilots seats. *The safety pin **must** be removed before flight.* The safety pin should be installed again during storage / parking of the aircraft to avoid inadvertent activation.

## 7.4. Flaps

The flaps are operated mechanically. The respective flap position is indicated by small diodes near the airspeed indicator.

## 7.5. Tyres

| Wheel | Size | Pressure |
|---|---|---|
| **Main** | 6.00 x 6 or 4.00 x 6 | 26 to 29 psi (1,8 – 2 bar) |
| **Front** | 4.00 x 4 | 22 to 29 psi (1,5 – 2 bar) |
| **Tail** | 4,72 inch | |

## 7.6. Baggage

There is one baggage compartment aft of the pilots seats accessible from the outside by a small door. It has a maximum capacity of 22 lbs (10 kg). The sum of fuel and baggage weight must not exceed 103 lbs (46,5 kg). Smaller items must be put into bags. All things in the baggage compartment must be fixed in order not to touch / restrict the flight control rods.

## 7.7. Seats and seatbelts

The backrests of the seats can be taken off their holds without tools to give easy access to the baggage compartment as well as for inspection of the aft fuselage. Ensure that they are firmly replaced in their holds afterwards. The 4-point seatbelts can be adjusted to fit every size. The lock is released by pressing the red button.

## 7.8. Doors

The doors can be opened and locked from inside with a handle. The pilots door can also be opened / closed from outside. Both doors have a small vent. Doors can be removed completely. Without doors, the airspeed must be limited to 54 kt (100 km/h).

## 7.9. Engine

The engine is a ROTAX 912 ULS four-cylinder, horizontally opposed engine rated at 100 HP at 5800 RPM The ROTAX has a combined cooling by liquid and air, the smart is liquid cooled.
The control levers for choke, carburetor heat (if installed) and throttle are located below the instrument panel.
The engine cowling can easily be removed for maintenance and checks. Oil and coolant can be checked by opening a small cap on the right upper part of the cowling.

## 7.10. Fuel System

There are two fuel tanks with a total capacity of 15,8 USG (60 liter) mounted behind the pilots seats. The fuel valve is located at the center console with positions ON and OFF. One fuel drain valve is located at the lower fuselage aft of the main landing gear. There is one fuel pump normally providing fuel to the engine.


Additionally there is an electrical fuel pump which should be ON during takeoff and landing.

One (optional) fuel pressure warning light indicates fuel pressure below minimum. In this case switch on the electrical fuel pump.

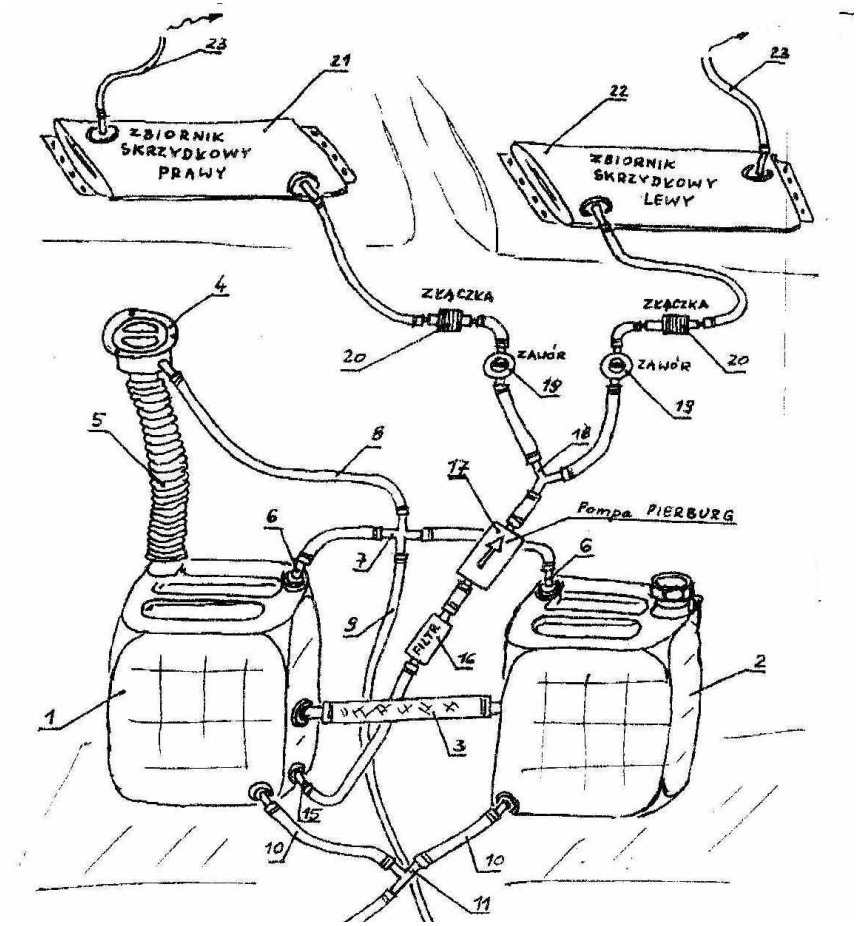
Fuel quantity is indicated by a gauge at the tank. After refuelling, this indication is accurate after both tanks have levelled. This can take up to 5 minutes.

Additionally installed is an electrical gauge on the center console. This gauge offers a rough estimate of the current fuel quantity. The accuracy of the gauge is not sufficient for flight planning purposes. This gauge indicates less than full with tanks completely filled.

Although the fuel cap has a water drain, it is recommended to secure the cap from water entering during strong rain by putting an extra cover on top of the cap when the aircraft is parked. The same applies to the openings on top of the engine cowling.

**Additional Wingtanks (option)**

Additional flexible fueltanks (capacity 20 Liter each) can be installed in the wings of the FK 9. They are connected to the main tank and are filled and emptied by using an electrical pump. The overflow / vent (23) is connected to the vent system (8) of the main tank. Each tank has a fuel valve (19).


ZBIORNIK SKRZYDŁOWY PRAWY
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ZAWÓR
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23

Handling of the wingtank:


To fill or empty the tank, the respective fuel valve (19) must be open and the pump must be switched to the ”up“ or “down” position.
Filling of the wintank has to be done on ground with at least 20 liter of fuel in the main tank. The wingtank is full as soon as fuel is flowing via the overflow / vent (23) into the vent system (8) of the main tank. Now the pump has to be switched off and the valve must be closed.
During flight, the fuel can be pumped out of the wingtank as soon there is space of at least 20 liter in the main tank.

## 7.11. Brakes

Brakes are controlled by a handle at the center console. Brakes are applied to both main wheels at the same time.
By closing a valve at the center console when pressure has been applied, the hydraulic brake can be function as a park brake.

## 7.12. Heating and Ventilation

The FK 9 is optionally equipped with cabin heating. By pulling the lever below the instrument panel, heated air is allowed to enter the cabin through the front of the pilots feet. The cabin is ventilated by the vents in the doors.

## 7.13. Electrical System

A detailed schematic of the electrical system is available under www.fk-lightplanes.com, section Tech service“.
A 12V engine-driven alternator delivers the required electricity.
If the red generator control light lights up above 1800 RPM shut off all electrical equipment not required for flight as the battery is discharged.

The electrical panel contains most of the switches and electric fuses.
The electrical system is designed for a maximum load of 12 A. Connecting a lot of high drain components (landing lights etc.) may result in a higher load. This can lead to overheating and / or an electrical smoke / fire condition and must be avoided under all circumstances.

**Fuses:**
Only fuses “with time lag“ should be installed

**Main Panel**


| Ext. Power | Pump | Eng.Instr. | Generator | Navigation | Radio |
|---|---|---|---|---|---|
| 2A | 8A | 500mA | 500mA | 2A | 2A |

**Additional Panel**


| no | 2A | 5A | 5A |
|---|---|---|---|

**Wingtank Panel**


**8A**

# 8. Handling, Servicing and Maintenance

## 8.1. General

Every owner of an FK 9 should keep close contact to the manufacturer for best support.

## 8.2. Ground Handling

Aircraft should be parked with the nose facing into the wind and secured by putting chocks in front of the wheels. To tie down the aircraft, attach long straps to the bolts connecting the wing to the strut and also tie down the nose- / tailwheel.
The aircraft should not be parked in wet conditions or exposed to UV radiation for a longer period of time.
The windscreen should always be covered during parking to avoid getting dirty.
The FK 9 can be stored in a trailer. For details consult the manufacturer.

## 8.3. Cleaning

A clean surface is very important for aircraft performance. Therefore the whole aircraft and especially the leading edges of the wings and propeller blades should be kept as clean as possible.
Cleaning is preferably done by using a lot of water, if required a mild soap may be added.
Once a year the painted surface should be treated with a silicon-free polish.

## 8.4. General Advice

- The vibration dampers at the engine mount should be treated regularly with vaseline to prevent aging.
- Fuel lines, cables and bowden-cables must not be damaged.
- **Note: never turn the propeller for more than 1 turn in opposite direction**
- **Airplane maintenance must be performed following the manufacturer's latest maintenance schedule. The actual maintenance schedule can be downloaded from the website www.fk-lightplanes.com or www.flugservice-speyer.de**

## 8.5. Regular Maintenance and Lubrication Schedule

Maintenance action is due after certain flight hours or time intervals as applicable.
There are some actions which must be done for the first time after the very first 2 / 10 / 25 flight hours. The regular maintenance intervals are 100 / 200 / 500 flight hours or every year / every 2 / every 4 years.
Engine maintenance must be performed additionally according to the respective engine manual.
Propeller maintenance must be performed additionally according to the respective propeller manual.

## 8.6. Time between Overhaul (TBO)

- For the main structure: none
- recommendation: engine overhaul according engine manual
- recommendation: propeller overhaul according propeller manual

insert
maintenance schedule FK 9 Airframe
(DIN A4) here.

## 8.7. Fuel System Check / Cleaning

If the fuel tanks are contaminated with dirt (check the inside by using a flashlight), they must be dismantled and cleaned. For this, drain the complete system (by using the electrical fuel pump) and dismantle all connections. Clean the tanks by using fuel or spirit / alcohol. Do not use water or solvents.

## 8.8. Control Surface Angle

| | Angle [°] | | Tolerance [°] |
|---|---|---|---|
| **Elevator** | | | |
| Up | -25 | | +2 / -1 |
| Down | +11 | | +2 / -1 |
| **Rudder** | | | |
| Right | 18 | | +2 / -1 |
| Left | 18 | | +2 / -1 |
| **Aileron (Flaps –10°)** | | shortwing | |
| Up | -14 | -20 | +1 / -1 |
| Down | +9 | +17 | +2 / -1 |
| **Flaps** | | | |
| Position 0 | -10 | | +1 / -1 |
| Position 1 | +5 | | +1 / -1 |
| Position 2 | +30 | | +1 / -1 |

## 8.9. Jacking / Towing / Storage

CAUTION
As a general rule, apply force to aircraft structure only on main structural elements such as frames, ribs or spars.

**Jacking:**
Use following points for jacking:

1. lower engine mount where connected to the fuselage or engine mount junctions (hanging up)
2. main gear beam where connected to the fuselage
3. nose- / tailwheel where connected to the fuselage

**Towing:**
For towing (forward only), connect the rope to the main gear.

**Storage:**
To stow the dismantled wings, use storage tools with a minimum contact area of 150 mm. The leading edge should have no contact to the storage tool in the first 20 mm.

For long distance transport in truck, trailer or container the following dismantling and storage procedure is recommended:

- Dismantle airframe including wings, tailplane.
- Secure controls
- Dismount wheel fairings to avoid damages
- Dismantle propeller
- Disconnect electric circuits, dismantle fuses and battery
- De-install shock-sensitive avionics (radio/transponder/glasspanels) and pack in upholstered boxes

Additional for street transport in trailer or truck:

- Remove liquids (oilsystem /coolingsystem)

Additional for air transport:

- Remove complete engine (counts as hazardous good for airfreight!)

Re-launching the aircraft in operation:
Proceed according to check list form “assembly plan / Montageplan”

## 8.10. Main / Subsidiary Structure

The main structure contains of:

1. fuselage structure (metal), tail unit structure, engine mount
2. landing gear (metal/carbon fibre composite)
3. control surfaces (metal)
4. main plane structure (metal/ carbon fibre composite)

***Repairs at the main structure must only be performed by authorized facilities!***

The subsidiary structure contains of:

1. front fuselage covers / cowlings (glass fibre composite)
2. wheel pants (glass fibre composite)
3. spinner
4. inside cockpit: covers / consoles / floor
5. skin

## 8.11. Materials for minor repairs

Repairs at the subsidiary structure may performed by the owner, however it is recommended to consult the manufacturer or a certified repair center before commencing the work.
Materials available for fuselage repair:

1. Glass fibre layer „Köper“ 160g/sqm
2. Epoxy-resin
3. Covering Ceconite 102 + adhesives (i.e. Polytak) + common dope
4. 2-component acrylic paint

## 8.12. Special Repair and Check Procedures

Use common procedures applicable for aircraft build from metal, composite and covering.

## 8.13. Required Tools

No special tools are required for normal maintenance.

## 8.14. Weighing

Weighing has to be performed according to the Weighing Form. Weighing intervals according to applicable rules.

## 8.15. Mounting / Maintenance of the Rescue System

According to the respective manual.

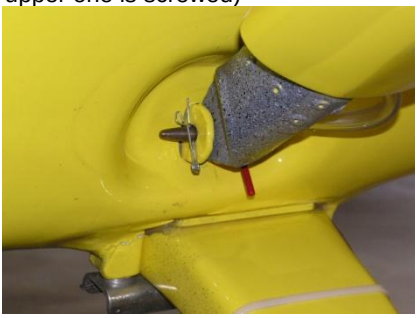
## 8.16. Assembly of the Aircraft

Assemble the aircraft as follows:

- Check all parts for damage
- Check fuselage and wings for loose or foreign objects
- Connect the wings to the fuselage (doors must be removed or closed)

- IMPORTANT for wing assembly:
  unfold the wing with the leading edge facing downwards; turn the wing into its normal position and push it towards the fuselage; close both wing bolts

- Install the strut with its two bolts (the upper one is screwed)



- Cover the gap between wing and fuselage with tape for better aerodynamics
- Secure all bolts

- Install the other wing in the same manner
- The storing device at the aft fuselage can be removed now
- Mount the outer parts of the elevator
- Connect and secure the rods for aileron and flaps
- Connect the pitot tube line
- Install the doors
- Install the strut covers (if available)
- Check the function of all flight controls and flaps

To disassemble the aircraft follow above mentioned steps in reverse order, observe the following steps.

- If required, remove the elevator tips
- install the storing device for the wings at the aft part of the fuselage
- Note: the screws at the main tube of the folding mechanism (overhead the pilots) are the stop for the folding mechanism; they must only be removed it is intended to remove the wings completely from the fuselage
- to fold the wing:
  pull the wing outside until the stop, turn it 90° (the leading edge facing to the ground), now fold it and store it into the device

# 9. Supplements

## 9.1. General

This chapter contains information concerning additional or differing equipment of the aircraft. Additional manuals and other useful information are indicated.

## 9.2. Engine Manual

A separate manual for the engine is supplied with every aircraft. Specifications of this manual are part of the airplane manual and must be observed.

## 9.3. Rescue System

A separate manual for the rescue system is supplied with every aircraft. Specifications of this manual are part of the airplane manual and must be observed.

## 9.4. Avionics / Special Engine Instruments

A separate manual for avionic components is supplied with every aircraft. Specifications of this manual are part of the airplane manual and must be observed. The equipment is installed according the manual and checked for proper operation.

## 9.5. Seaplane Floats

If the aircraft is equipped with Seaplane Floats, the maximum take off weight ist 1235 lbs. Observe Chapter 2 Limitations.
Differences to the basic airplane in normal / abnormal operation are to be determined.
Maintenance of the Floats must be done according the respective manual.

## 9.6. Sailplane Towing

### 9.6.1. Technical Data / Limitations

| | | |
|---|---|---|
| 1. | max. sailplane gross weight* | 650 kg |
| 2. | takeoff distance to 15m | 550m |
| 3. | towing rope type: "200 Polyester / 6mm"<br>max. mass of towing rope (including all parts)<br>recommended designed fraction value<br>max. fraction value towing aircraft<br>rope lenght | 600 daN<br>1,5 kg<br>150 daN<br>200 daN<br>45-55m |
| 4. | min. towing speed | 95 km/h |

*check for further recommandations in the following chapters

Valid for ISA conditions.

For further information contact the manufacturer.