Pilot's Operating Handbook & approved Flight Manual

FK 14 B

POH FK 14 B Polaris Advanced Italien regulation type

Approved as Ultralight/ Light Sport Aircraft

DPR 133/Annex V°

Airplane Serial Number: _____

Airplane Registration Number: _____

Date of issue: _____

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B & F Technik Vertriebs GmbH Speyer – Germany

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0. Introduction

0.1. Revisions

The owner/operator is responsible for keeping all pages of this manual to the revision status indicated in the table, by exchanging the relevant pages as and when a new revision is published.
For updates check the homepage of B&F Technik under www.fk-aircraft.com or www.flugservice-speyer.de regularly.
Revisions and Service Bulletins for the ROTAX engine are available on www.rotax-aircraft-engines.com .
This revision information page shall be filed behind the checklist for amendments for about 6 month in order to get at a glance all the changes that became effective during this time.

Index/Page	remove REV	insert REV	Remark / Reason for REV
0-1 to 0-3	25	26	new revision
0-11	23	26	0.4.2.+0.4.3. contact data revised
2-3	23	26	2.5 Helix props added
5-1	24	26	5.2 Helix props added, editorial change
8-1	23	26	8.4 website revised
9-2	23	26	9.6 Helix prop added

0.2. Record of Revisions

The fact of having inserted revised pages shall be confirmed in the list below.

Revision		inserted
No.	**of**	**by --- on**
Rev 23	1.Apr.2014	done
Rev 24	1.Oct 2015	done
Rev 25	1.May 2017	done
Rev 26	1. June 2019	

Revision		inserted
No.	**of**	**by --- on**

List of effective Pages

Page	Revision	Date		Page	Revision	Date
0-1	26	1.06.19		0-2	26	1.06.19
0-3	26	1.06.19		0-4	24	1.10.15
0-5	24	1.10.15		0-6	24	1.10.15
0-7	24	1.10.15		0-8	24	1.10.15
0-9	24	1.10.15		0-10	23	1.04.14
0-11	26	1.06.19				
1-1	25	1.05.17		1-2	24	1.10.15
1-3	24	1.10.15		1-4	23	1.04.14
2-1	24	1.10.15		2-2	23	1.04.14
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2-5	24	1.10.15		2-6	23	1.04.14
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4-3	24	1.10.15		4-4	23	1.04.14
4-5	23	1.04.14		4-6	24	1.10.15
4-7	23	1.04.14				
5-1	26	1.06.19		5-2	24	1.10.15
5-3	23	1.04.14				
6-1	23	1.04.14		6-2	23	1.04.14
6-3	23	1.04.14				
7-1	23	1.04.14		7-2	23	1.04.14
7-3	23	1.04.14		7-4	25	1.05.17
7-5	24	1.10.15		7-6	24	1.10.15
7-7	24	1.10.15		7-8	24	1.10.15
7-9	25	1.05.17				
8-1	26	1.06.19		8-2	25	1.05.17
8-3	23	1.04.14		8-4	23	1.04.14
8-5	23	1.04.14		8-6	23	1.04.14
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9-1	23	1.04.14		9-2	26	1.06.19
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0.3. Table of Contents

0.4. Introduction

This is the Pilot's Operating Handbook and approved flight manual.
It contains information required to be furnished to the pilot and must be carried in the aircraft at all times.
This manual must be read carefully by the owner and operator in order to become familiar with the operation of the FK 14. 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) unless otherwise indicated.
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 will void warranty and/or guarantee claims.

All variants of airframes and powerplants can be combined as certified.

0.4.1. Certification Basis

This airplane meets following ASTM / Ultralight standards:

- F 2245-10c Design and Performance of a Light Sport Airplane
- F 2483-05 Maintenance and the Development of Maintenance Manuals for Light Sport Aircraft
- F 2746-09 Standard Specification for Pilot's Operating Handbook for Light Sport Airplane
- BFU 95 / LTF-UL 2003

0.4.2. Airplane Manufacturer

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0.4.3. Design Organization, Owner of IP Rights and Customer Support

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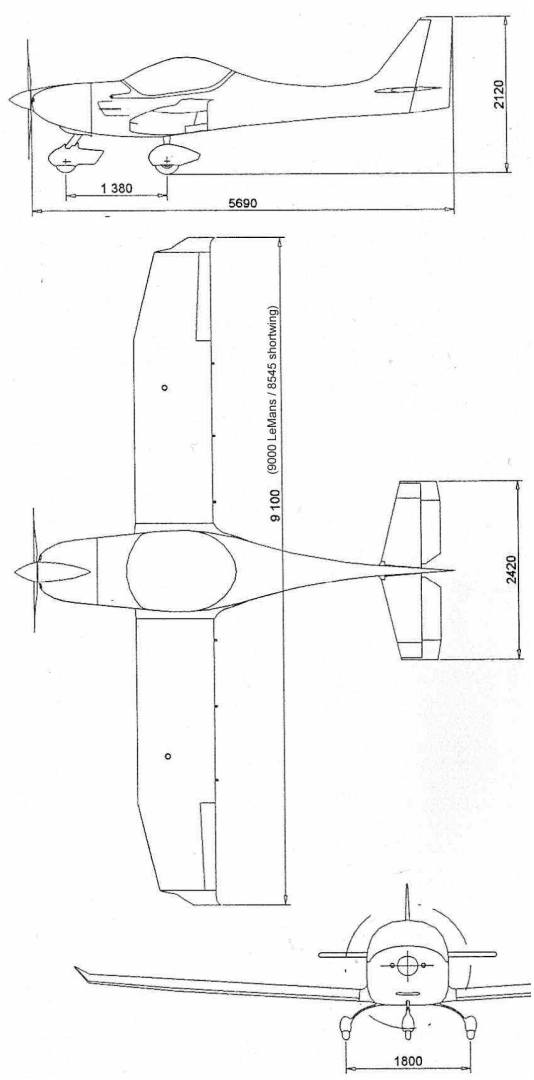
1. General

1.1. Airplane Three Side View



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1.2. Technical Data

Wing span:	9,10 m	Wing area:	9,10 m²
	9 m LeMans	LeMans	9 m²
	8,545 m shortwing	shortwing	8,65 m²
Length:	5,69 m	Height:	2,12 m

1.3. Weight

The aircraft has a maximum take-off weight depending on configuration and certification of up to 544kg (1199 lbs).

1.4. Airspeeds and Performance

all speeds IAS at MTOW 544kg

Top speed (0ft ISA, MTP)	250 km/h	135 kt
Cruise speed (2000ft ISA, 75% MCP)	223 km/h	120 kt
Max. range (ROTAX 912S) at TAS 230 km/h / 124 kt (2000ft ISA, 75% MCP wing tank 78 Ltr / 10 Ltr. Res.)	845 km	456 NM
Best rate of climb Vy (flaps up)	148 km/h	80 kt
Best angle of climb Vx (flaps 1)	118 km/h	64 kt
Stall speed flaps up	94 km/h	51 kt
Stall speed flaps full down	71 km/h	38 kt

1.5. Fuel

Capacity	total fuel capacity	total useable fuel
wing tank version	66 Ltr (17,4 USG)	61 Ltr (16,1 USG)
wing tank vers. (option)	78 Ltr (20,6 USG)	73 Ltr (19,3 USG)
wing tank vers. (option)	96 Ltr (25,4 USG)	91 Ltr (24,0 USG)

Approved Fuel Grades:
Car fuel without bioethanol (min 95 RON), MOGAS, AVGAS 100LL
Unleaded fuel recommended
AVGAS should only be used if MOGAS is not available or in case of problems caused by vapour locks

1.6. Engine

engine	max.T/O PWR (5minutes)	max. continuous PWR
ROTAX 912	59,6 kW (80hp) at 5800 RPM	58 kW (78hp) at 5500
ROTAX 912 S	73,5 kW (100hp) at 5800 RPM	69 kW (93hp) at 5500
ROTAX 912 iS	73,5 kW (100hp) at 5800 RPM	69 kW (93hp) at 5500

1.7. 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
VRA	Maximum speed in turbulence
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
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 (IAS) are based on a weight of 472,5 kg (UL) respectively 544kg (1199 lbs) (LSA), after modification according TM 014-01-2012 different airspeed limitations apply:

	472,5kg	472,5kg after TM	544kg / 1199 lbs
V_{NE} *:	250 km/h / 135 kt	270 km/h / 146 kt	250 km/h / 135 kt
V_{NO} :	225 km/h / 121 kt		225 km/h / 121 kt
V_A :	172 km/h / 93 kt		188 km/h / 102 kt
(Flaps 1) V_X :	100 km/h / 54 kt		118 km/h / 64 kt
(Flaps up) V_Y :	145 km/h / 78 kt		148 km/h / 80 kt
CWC:	28 km/h / 15 kt		
$V_{FE\ full\ flaps}$	100 km/h / 54 kt	114 km/h / 62 kt	118 km/h / 64 kt
$V_{FE\ flaps\ 2}$	115 km/h / 62 kt	122 km/h / 66 kt	126 km/h / 68 kt
$V_{FE\ flaps\ 1}$	125 km/h / 67 kt	135 km/h / 73 kt	139 km/h / 75 kt
$V_{S\ clean}$	86 km/h / 46 kt		94 km/h / 51 kt
V_{S0}	65 km/h / 35 kt		71 km/h / 38 kt

*** Caution:**
During flights above 10.000ft (pressure altitude) the $\mathbf{V_{NE}}$ is reduced by 20km/h / 11kt.
This assures that - despite of the high TAS – there is enough margin to the tested flutter speeds.

2.3. Airspeed Indicator Markings

The aircraft must be equipped with an airspeed indicator model „Winter FK14-EK5“. This is the master airspeed indicator, even with an EFIS installed.It has following markings and shows IAS in [km/h / kt]:

	472,5 kg	**472,5 kg** after TM	**544 kg** **1199 lbs**
white arc: 1,1*V_{SO} to V_{FE} full flap operating range	72 - 100 km/h 39 to 54 kt	72 - 114 km/h 39 to 62 kt	78 - 118 km/h 42 to 64 kt
green arc: 1,1*V_{S1} to V_{NO} normal operating range (flaps up)	95 - 225 km/h 51 to 122 kt	95 - 225 km/h 51 to 122 kt	104 - 225 km/h 56 to 122 kt
yellow radial: at V_A maneuvering speed	172 km/h 93 kt	172 km/h 93 kt	188 km/h 102 kt
yellow arc: V_{NO} to V_{NE} operate with caution, only in smooth air	225 - 250 km/h 122 to 135 kt	225 - 270 km/h 122 to 146 kt	225 - 250 km/h 122 to 135 kt
red radial: at V_{NE} max. speed for all ops.	250 km/h 135 kt	270 km/h 146 kt	250 km/h 135 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
Max. T/O RPM	5800 RPM
Max. cont.RPM	5500 RPM
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 50°C (122°F) max. 130°C / (266°F)
Oil pressure	0.8 bar / 12 psi (below 3500 RPM) to 5 bar / 73 psi (cold engine start up to 7 bar / 102 psi
Fuel pressure	0,15 bar / 2,2 psi to 0,4 bar / 5,8 psi iS: 2,8 – 3,2 bar / 40,6 – 46,4 psi
CHT	max. 120°C / 248°F when using water / glycol mixture

Note: Oil system, Engine lubrication system
Engines which have had the prop spun for more than 1 turn in reverse direction allow air to be ingested 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

Pos.	Engine	Propeller	Diameter
01	ROTAX 912 ULS	Warp / DUC 3 – Blades	1720 mm
02	ROTAX 912 ULS	Mühlbauer 3 – Blades constant speed	1570 mm
03	ROTAX 912 ULS	Warp / DUC 3 – Blades	1720 mm
04	ROTAX 912 ULS	Neuform 3 – Blades constant speed	1700 mm
05	ROTAX 912 iS	Mühlbauer 2 – Blades constant speed	1750 mm
06	ROTAX 912 ULS	Helix 2 - Blades H50F	1750 mm
07	ROTAX 912 ULS	Helix 2 - Blades H60A constant speed	1750 mm

2.6. Service Ceiling

The maximum Altitide in ISA conditions at a weight of 544 kg is:

Engine	ceiling	Please observe Oxygen requirements and respect any local regulations and rules!
ROTAX 912 ULS	16000ft = 4877m	

2.7. Weights

Empty weight:	acc. actual weighing	
Maximum weight per seat:	100 kg	220 lbs
Baggage aft max:	10 kg	22 lbs
zero fuel weight max.:	520 kg	1147 lbs
Max. Takeoff / Landing Weight:	472,5 kg	544 kg
(depending on country rules)		1199 lbs

2.8. C.G. Limits

forward center of gravity:	0,280 m / 11,02 inch behind datum
aft center of gravity	0,431 m / 16,97 inch behind datum

Datum is the leading edge of the wing.
For weighing, the firewall has to be in the vertical position.
The aft CG limit for the empty weight is 0,286 m (11,26 inch) aft of datum. If required it must be achieved by adding balance weights.

Version "LeMans":
The open canopy of the "LeMans" has a similar weight as the closed canopy, so there is no effect on weight & balance calculations.

2.9. Maneuvers

The FK 14 is an approved Ultralight or Light Sport Aircraft (LSA), (in USA according FAA S-LSA).
Acrobatic maneuvers, including spins, bank angles greater than 60°, as well as IFR and VFR night are prohibited.
Note regarding spins: In the light aircraft/ultralight 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 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.
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.

2.10. 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

2.11. Kind of Operation

The FK 14 is approved as Ultralight / Light Sport Aircraft for daytime VFR.

2.12. Fuel

Capacity	total fuel capacity	total useable fuel
wing tank version	66 Ltr (17,4 USG)	61 Ltr (16,1 USG)
wing tank vers. (option)	78 Ltr (20,6 USG)	73 Ltr (19,3 USG)
wing tank vers. (option)	96 Ltr (25,4 USG)	91 Ltr (24,0 USG)

Never perform a takeoff on a tank containing less than 10 Ltr / 2,6 USG!

96 Ltr tank version only permitted with vortex generators installed

Approved Fuel Grades:
Car fuel without bioethanol (min 95 RON), MOGAS, AVGAS 100LL
Unleaded fuel recommended
AVGAS should only be used if MOGAS is not available or in case of problems caused by vapour locks
Engine operating manual is the governing one!

2.13. Passenger Seating

The aircraft has 2 seats. The pilot occupies the left seat, however it can be flown from either seat. Everything required for safe flight is within reach of every seat.

2.14. Colour

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

2.15. Electric

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

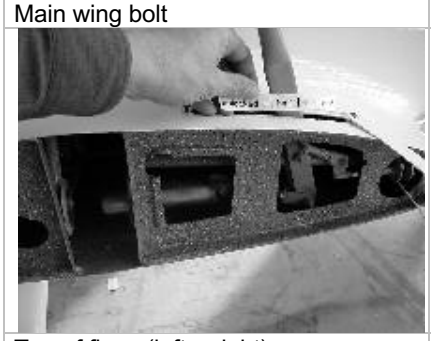
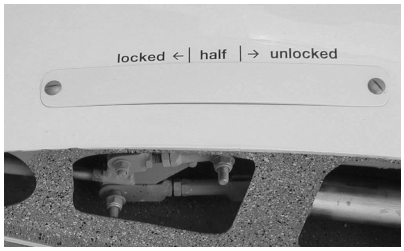
2.16. Power Plant Instrument Marking

ROTAX 912 S

Instrument	Units	Red line Lower limit	Green arc Normal range	Yellow arc Caution range	Red line Upper limit
RPM	RPM	-	1400 - 5500	5500 - 5800	5800
Oil temp.	°C	-	90 – 110	50- 90 110 – 130	130
	°F	-	194- 230	122 – 194 230 - 266	266
Oil press.	bar	0.8	2 - 5	0,8 – 2 5 - 7	7
	PSI	12	29 - 73	12 -29 73 -102	102
Fuel press	bar	0.15	0.15 – 0.4	-	0.4
	PSI	2.2	2.2 – 5.8	-	5.8
Cylinder head temp	°C	-	-	-	120
	°F	-	-	-	248

2.17. Placards

Location:	**Placard:**
In the Cockpit	max. TOW 472,5 kg / 544 kg center of gravity 280 – 431mm spins and acrobatics prohibited
Cockpit	Weighing date: Empty weight: Poss. load including fuel:
Cockpit sidewall	Type placard (metal)
Fuel selector	CLOSE – OPEN L – OPEN R 912iS: LEFT – RIGHT - OFF
Fuel return valve	fuel return - CLOSE
Aft baggage area	max. load 10 kg
Brakes	brake
Throttle	throttle
Canopy handles	open / close
Flaps (top)	flaps up
Flaps (bottom)	down
Choke	choke
Carburetor Heat	carb. (option)
Cabin Heat	heat (option)
Trim handle	Nose up / nose down
Trim handle neutral	Neutral marking
Oil temperature indication VDO	OIL
CHT indication VDO	CHT
Rocket Exit Area	Danger: Rocket Exit Area
Fuel caps	FUEL AVGAS / MOGAS
Firewall (from engine)	placard Rescue system

Wheel fairings main wheels	2,8 bar / 41 psi
Wheel fairings nose wheel	1,5 bar / 26 psi
Aft part of wing	no step
Step area on the wing	marking
Main wing bolt	locked-half-unlocked
	
Top of flaps (left + right)	Flap position indicator (red)
	

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. Airspeeds for Emergency Procedures

Best glide speed: 145 km/h (UL) respectively 148 km/h / 80 kt (LSA) flaps up, Glide ratio is about 1:10.
Landing speed full flaps: 95 km/ h (UL) or 100 km/h / 54 kt (LSA)
Speeds mentioned in the procedures reflect the higher LSA weights.

3.3. Engine / Carburetor Fire

Fuel selector	CLOSE
Throttle	full open
if required:	
Starter	engage
after engine stops:	
Ignition & battery switch	OFF (912iS: LANE A+B OFF)
On ground:	leave airplane, try to extinguish fire
In flight:	perform Emergency Landing Proc.

3.4. Engine Failure

during takeoff run:

Throttle	idle
Brakes	as required
Electrical fuel pump	OFF
Fuel selector	CLOSE
Ignition	OFF (912iS: LANE A+B OFF)
Battery switch	OFF

in flight:

Glide speed	148 km/h / 80kt flaps up
Electrical fuel pump	ON (req. for starter engagement)
912 iS only: AUX	ON
Fuel selector(s)	check fullest tank OPEN
912 iS only: LANE A+B	reset (OFF then ON)
Engine	start
No restart possible:	
Emergency landing	perform respective procedure

3.4.1. ROTAX 912iS

EMS Caution Lights: as soon as one or both EMS caution lights illuminate or flash, a precautionary landing must be done at the next suitable airfield.

Special Emergency Procedures:

For more details concerning engine related emergency procedures, refer to the engine manual.

3.5. Emergency Landing

without Engine Power:

Glide speed	148 km/h / 80 kt flaps up
Emergency field	select
Emergency call (121,5 MHz)	perform
Throttle	idle
Electrical fuel pump	OFF
Fuel selector	CLOSE
Ignition	OFF (912iS: LANE A+B OFF)
Safety belts	pull tight
Final, landing assured:	
Flaps	Full down; *Attention: full flaps cause a lot of drag*
Battery switch	OFF
Approach speed	100 km/h / 54 kt

The glide can be controlled by changing airspeed, flap setting or slip. Flaps in position 2 and 3 cause a lot of drag. Touchdown should be achieved at minimum speed.

Engine Power available:

Emergency field	select
Emergency call (121,5 MHz)	perform
Safety belts	pull tight
Normal landing	perform

3.6. Emergency Descent

Throttle	idle
Flaps	retracted (up)
Airspeed	max V_{NE}, in turbulence max V_{RA}

3.7. Strong Vibrations

Caused by engine or propeller:	
Ignition	OFF (912iS: LANE A+B 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	idle
Ignition	OFF (912iS: LANE A+B OFF)
Rescue system	activate
Electrical fuel pump	OFF
Fuel selector	CLOSE
Emergency call (121,5 MHz)	perform
Battery switch	OFF
Safety belts	pull tight
Canopy	handles in OPEN position

3.9. Oil Pressure Low

Oil pressure indicator	check
Throttle	min. necessary power
if oil pressure still low	perform precautionary landing

3.10. Fuel Pressure Low

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

3.11. Generator Fault

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

Generator Fault ROTAX 912iS

If generator A fails, generator B automatically takes over and supplies the engine but the battery will no longer be charged. Therefore switch OFF all non-essential devices in order to save battery power.
In case of GEN A+B fault, the engine stops. ***Immediately switch backup battery (guarded switch) to ON. Restart the engine.***
Land as soon as possible. The engine is supplied by the aircraft battery only. If the battery is exhausted, the engine will stop.

3.12. Fire and Smoke (Electric)

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

3.13. Stall recovery

A stall can be recognized by light buffeting.

Elevator	push
Wings	level
Aircraft	recover

Normally the FK 14 does not enter a spin out of a slowly initiated stall.
Spin recovery (if a spin is entered inadvertently):

Power	idle
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.

Altitude loss and pitch during stall (values for MTOW 544 kg):

Configuration	V_S	Altitude loss	Pitch after stall
flaps 0, idle	94 km/h / 51 kt	20 - 30m	- 25°
flaps 0, full power	94 km/h / 51 kt	20 - 30m	- 10°
flaps 3, idle	71 km/h / 38 kt	20 - 30m	- 50°
flaps 3, full power	71 km/h / 38 kt	20 - 30m	- 10°

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 14 B.

4.2. Recommended Speeds

		up to 472,5 kg	more than 472,5 kg / 1041 lbs
Best angle of climb speed:	(Flaps 1) V_X :	100 km/h / 54 kt	105 km/h / 57 kt
Best rate of climb speed:	(Flaps up) V_Y :	145 km/h / 78 kt	148 km/h / 80 kt
Approach speed	flaps 2	110 km/h / 59 kt	110 km/h / 59 kt
Approach speed	flaps 3	95 km/h / 51 kt	100 km/h / 54 kt

4.3. Regular Inspection

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.

4.4. 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.

Items marked by * must be performed prior first flight of the day only.

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 (912iS: LANE A+B OFF)
Cabin	no loose objects
* Flight controls	connected and secured
* Belts, seats	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
* If installed: Gascolator	drain fuel, check for water / dirt
* Cowling	install
Cooling system / air inlets	clean, inlets clear

Outside check	
canopy	clear, no cracks
fuel quantity	check both tanks
left fuselage	clean, no damage
static port	clear
elevator	clean, no damage, freedom of movement; *connections OK + secured
rudder	clean, no damage, freedom of movement; *connections OK + secured
right fuselage	clean, no damage
right wing	clean, no damage, flaps full up; fuel cap closed; number of vortex generators
right aileron	clean, no damage, freedom of movement; *connection OK + secured
right landing gear	*check brake line, strut ; check main attachment screws
right drain valve	*check fuel for contamination
right tire	*pressure 2,4 to 2,9 bar (35 – 42 psi)
baggage door (if installed)	closed
engine check	performed as prescribed above
propeller	no damage, cracks
cowling	closed, air intakes free
nose wheel	check strut
nose wheel tire	*pressure 1,5 to 1,8 bar (22 – 26 psi)

left landing gear	*check brake line, strut; check main attachment screws
left tire	pressure 2,4 to 2,9 bar (35 – 42 psi)
left wing	clean, no damage, flaps full up; fuel cap closed; number of vortex generators
left drain valve	*check fuel for contamination
pitot tube	installed, clean, cover removed
left aileron	clean, no damage, freedom of movement; *connection OK + secured
Tail wheel only	
tail wheel	wheel OK; *connection OK + secured

4.5. Engine Start

Specials concerning engine start of the ROTAX 912 iS are mentioned in Chapter 9.

Seat belts	fastened
Canopy	closed and locked
Fuel selector	fullest tank (right,if both are full)
no TAKEOFF on a tank containing less than 10 Ltr / 2,64 USG	
Fuel return line valve	as required
all electrical equipment	OFF
Circuit breaker	check
Instruments	check & set
Rescue system	check safety pin removed
Battery switch	ON
Ignition	ON
Electrical fuel pump	ON (important for starter engagement)
Choke	pull (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	OFF
Avionics	ON
Electrical fuel pump	OFF
Fuel return line valve	closed

4.6. Taxi

Brakes	check
Stick	pull back to relieve load on nosewheel
Rudder	do not move if aircraft is not moving

4.7. Before Take-off

Brakes	set; brakes must hold at least 3200 RPM
Instruments	check
Choke	check OFF
Magnetos	check at 4000 RPM; variance between mags. max. 115 RPM, max. drop 300 RPM
Electrical fuel pump	ON
Carburetor heat	OFF (if installed)
Flaps	takeoff position (Pos. 0 or 1); check for symmetrical extension
Flight controls	check
Trim	takeoff position
Canopy	closed and locked
Oil temperature	min. 50°C / 122°F
CHT	min. 60°C / 140°F

4.8. Takeoff

Brakes	apply
Throttle	advance slowly to full power
Engine instruments	check, min. 4500 RPM
Brakes	release
Elevator	neutral
Nose / tail wheel	keep on ground until 70 km/h (+5 km/h in crosswind conditions)
at 100 km/h / 54 kt	rotate
Climb	120 km/h / 65 kt with flaps in Pos. 1 148 km/h / 80 kt with flaps in Pos. 0
Clear of obstacles, at safe altitude:	
Flaps	up
Electrical fuel pump	OFF

At full takeoff power with left crosswind, full rudder might not be sufficient at speeds below 75 km/h, to keep the aircraft on centerline if the nose / tail wheel is already off the ground.
It is not recommended to perform a takeoff with flaps in Pos. 2 or 3, because the fowler flaps produce at lot of drag in this positions.

4.9. Climb

	ROTAX 912	
Oil temperature	max. 130°C / 266°F	
CHT	max. 120°C / 248°F	
Speed	148 km/h / 80 kt with flaps up	

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

4.10. Cruise

	ROTAX 912	
Oil temperature	max. 130°C / 266°F	
CHT	max. 120°C / 248°F	
Speed	as required	
Trim	set	
Fuel	monitor: switch tanks at least every 60 min; max. 15 Ltr / 4 USG difference between tanks	

For values of fuel flow and range check chapter 5.
During flights in sunny weather conditions, it is recommended to assure proper protection against heatstroke.

4.11. Descent

Carburetor heat	ON (if installed)
Fuel selector	fullest tank
Oil temperature	min. 50°C / 122°F
CHT	min. 60°C / 140°F

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

4.12. Landing

Normal Landing	
Speed	reduce to 125 Km/h / 67 kt
Flaps	set Pos. 1, after speed reduction Pos. 2
Speed	110 km/h / 59 kt (rain + 5km/h / 3 kt)
Electrical fuel pump	ON
Short prior touchdown	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 125 Km/h / 67 kt
Flaps	set Pos. 1, after speed reduction Pos. 2
Speed	110 km/h / 59 kt (rain + 5km/h / 3 kt)
On final	reduce speed to 105 km/h / 57 kt
Flaps	set Pos. 3
Speed	95 km/h / 51 kt to 100 km/h / 54 kt (rain + 5km/h / 3 kt)
Short prior touchdown (not to early!)	achieve touchdown at minimum speed
Throttle	idle
Go Around	
Throttle	advance slowly to full power
Speed	min. 100 km/h / 54 kt
Flaps	retract to / maintain Pos. 1
Carburetor heat	OFF (if installed)
Speed	120 km/h / 65 kt
Trim	set
Clear of obstacles, at safe altitude:	
Flaps	up
Electrical fuel pump	OFF
Speed	148 km/h / 80 kt

Engine torque is high during full power, therefore even full (right) rudder might not be enough under certain circumstances to keep the aircraft on centerline. During go around, power must be applied slowly and speed increased to at least 100 km/h / 54 kt before applying full power and flaps should be retracted to Pos. 1 as soon as practicable.

Under certain conditions (crosswind, turbulence, forward CG) it is recommended to retract flaps immediately after touchdown. During strong and/or gusty winds it is recommended to use flaps Pos. 1 for approach and landing.

4.13. Balked Landing

Throttle	max. power
Airspeed	min. 100 km/h / 54 kt
Flaps	Pos. 1
Carburetor heat	OFF (if installed)
Speed	120 km/h / 65 kt
Trim	as required
Clear of obstacles, at safe altitude:	
Flaps	up
Electrical fuel pump	OFF
Speed	148 km/h / 80 kt

4.14. Touch and Go

Flaps	retract to Pos. 1
Carburetor heat	OFF (if installed)
Trim	set takeoff position
Throttle	advance slowly to full power
at 100-110 km/h / 54-59 kt	rotate
Speed	120 km/h / 65 kt
Clear of obstacles, at safe altitude:	
Flaps	up
Electrical fuel pump	OFF
Speed	148 km/h / 80 kt

4.15. After Landing / Parking

Flaps	up
Trim	takeoff position
Carburetor heat	OFF (if installed)
Electrical fuel pump	OFF
Avionics	OFF
Ignition	OFF
Battery switch	OFF
Rescue system	secure (insert safety pin)
Pitot tube	remove and stow

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 compliance with aforementioned procedures.

5.2. Takeoff Distance

Conditions: Mean sea level (MSL), no wind, dry grass surface, takeoff weight 472,5 kg, flaps pos. 1

Propeller	Engine	Takeoff run	to 15 m / 50 ft Height
Warp / Duc / Helix	912 ULS	119m	185m
Mühlbauer/ Helix const. spd	912 ULS	114m	175m
Warp / Duc / Helix	912 UL	128m	195m
Neuform const. speed	912 ULS	120m	246m
Mühlbauer const. speed	912 iS	114m	175m

Conditions: Mean sea level (MSL), no wind, dry grass surface, takeoff weight 544 kg / 1199 lbs, flaps pos. 1, V_R 100 km/h / 54 kt, Vx 118 km/h / 64 kt.

Propeller	Engine	Takeoff run	to 15 m / 50 ft Height
Warp / Duc	912 ULS	189 m / 620 ft	353 m / 1158 ft
Mühlbauer	912 ULS	180 m / 591 ft	345 m / 1132 ft
Warp/ Duc/ Helix	912 UL	217 m / 712 ft	394 m / 1293 ft
Neuform / Helix	912 ULS	183 m / 600 ft	348 m / 1142 ft
Mühlbauer	912 iS	180 m / 591 ft	345 m / 1132 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)	+ =
2. Temperature:	+/- 1% per°C temperature deviation	+/- =
3. Slope:	+/- 10% per 1% slope	+/- =
4. wet surface:	+ 10 %	+ =
5. soft surface:	+ 50%	+ =
6. high grass:	+ 20%	+ =

5.3. Climb Performance

Weight 544 kg / 1199 lbs, ROTAX 912S, fixed propeller, ISA conditions

speed / configuration	performance
Vx 118 km/h / 64 kt with flaps 1	4,57 m/s / 900 ft/min
Vy 148 km/h / 80 kt with flaps up	5.59 m/s / 1100 ft/min

5.4. Cruise Performance

Weight 544 kg / 1199 lbs, ROTAX 912S, fixed propeller, ISA conditions
Values for ROTAX 912 iS are 5-7% better than given numbers.

Power	**55% / 4300 RPM**	**65% / 4800 RPM**	**75% / 5000 RPM**
CAS	195 km/h / 105 kt	212 km/h / 114 kt	223 km/h / 120 kt
fuel	14,5 l/h	17,5 l/h	18,5 l/h

5.5. Landing Distance

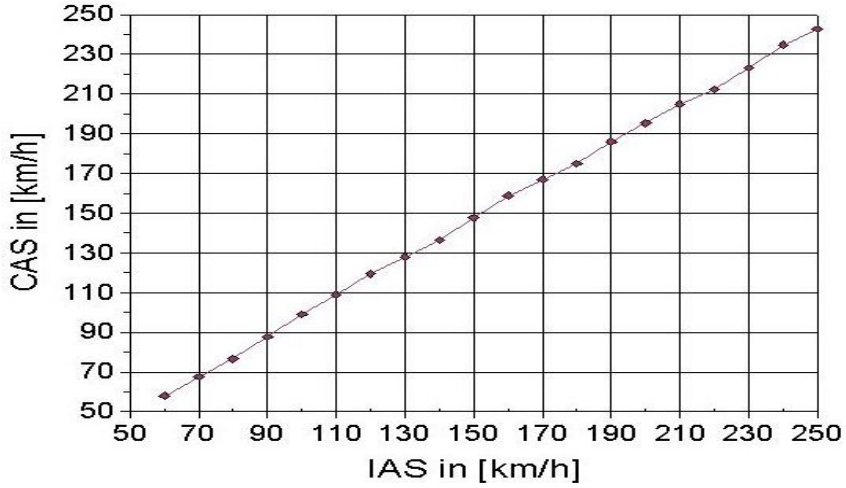
Conditions: Mean sea level (MSL), dry grass surface, no wind, landing weight 544 kg / 1199 lbs, flaps pos. 3, Vapp 95 km/h / 51kt, normal braking.

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)	+ =
2. Temperature:	+/- 0,5% per°C temperature deviation	+/- =
3. Slope:	+/- 10% per 1% slope	+/- =
4. wet surface:	+ 15 %	+ =
5. snow surface:	+ 25%	+ =
6. high grass:	+ 20%	+ =

5.6. Airspeed Calibration



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 flight characteristics. 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 ensure 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 [m / inch] $CG = \frac{\sum M}{\sum G}$

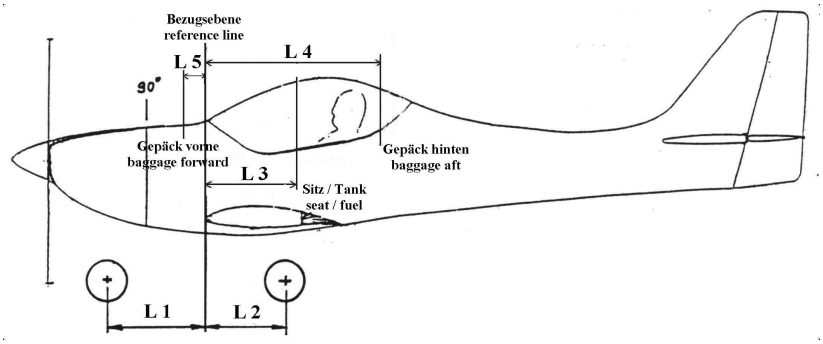
TW = total weight
WF = weight front
WR = weight right
WL = weight left

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

Tricycle

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

Tailwheel
WA = weight aft



Arms (Datum: wing leading edge):

L 1 nose wheel	acc. empty	L 4 bag. aft	1,21 m / 47,64 inch
L 2 wheels	weight form	L 5 bag. forw.	-0,28 m / -11,02 inch
L 3 seat / fuel	0,57 m / 22,44 inch		

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]
Right wheel	WR = 115,2	L 2 = 0,557	64,17
Left wheel	WL = 118	L 2 = 0,557	65,73
Nose wheel	WF = 70,7	L 1 =- 0,828	- 58,54
Empty weight-data	Empty weight **303,9**	C.G. **0,235**	**71,35**
Pilot(s) / fuel	158,6	L 3 = 0,57	90,4
Baggage aft	5	L 4 = 1,21	6,05
Baggage forward	5	L 5 = -0,28	-1,40
Total	Total Weight **472,5**	C.G (0,28 to 0,431) **0,352**	Total Moments **166,405**

Form:

Position	Weight [kg]	Arm [m]	Moment [mkg]
Right wheel	WR = _____	L 2 = _____	_____
Left wheel	WL = _____	L 2 = _____	_____
Nose wheel	WF = _____	L 1 =-_____	_____
Empty weight-Data	Empty weight	C.G.	
Pilot(s) / fuel	_____	L 3 = 0,57	_____
Baggage aft	_____<10kg	L 4 = 1,21	_____
Baggage forward	_____	L 5 = -0,28	_____
Total	Total Weight	C.G (0,28 to 0,431)	Total Moments

7. Systems Description

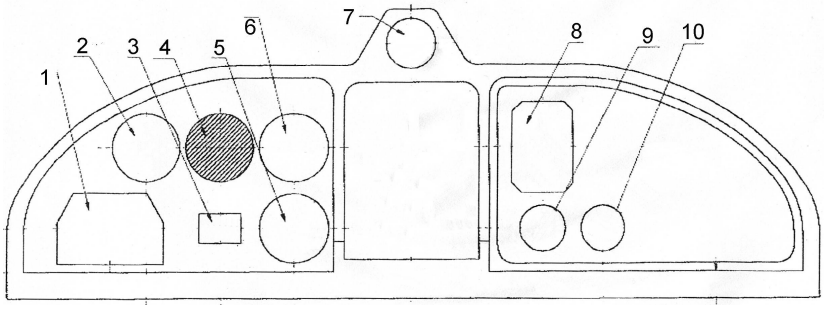
7.1. General

The FK 14 is a two-seat low wing ultralight aircraft with aerodynamic steering. The wing has flaps which are operated electrically. The nose / tail wheel is steered by use of the rudder pedals. The aircraft is fitted with dual controls and can be flown from either seat.

7.2. Instrument Panel

The instrument panel contains all required flight and engine instruments.
Controls to operate flaps, choke, cabin heat, carburetor heat, brakes and trim are located at the center console.

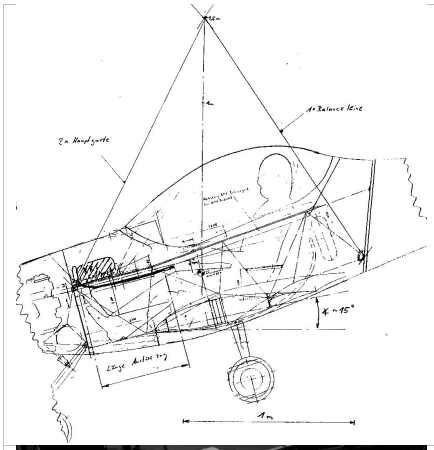
This describes a standard equipment configuration, different options can be provided on request.



1	Electric panel	5	Vertical speed	9	Oil pressure
2	Speed indicator	6	Altimeter	10	Oil temperature
3	Slip indicator	7	Compass		
4	open	8	ULMIP / engine instruments		

7.3. Rescue system

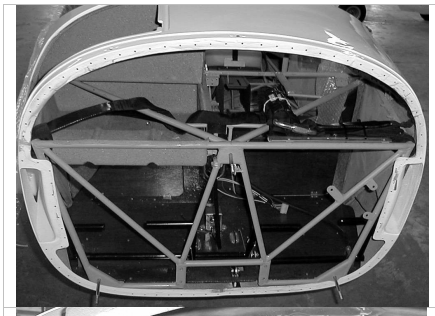
The rescue system of the FK 14 is installed in front of the instrument panel on the left side. Detailed information concerning max. speed, capacity and maintenance cycles are provided in the respective rescue system manual.
The system is activated by pulling the red handle in front of the pilot below the instrument panel. *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.



The length of the main harness in relation to the balance harness is calculated to result in a nose-down attitude of 15 to 20°.

Observe installation advice of BRS!

The balance harness is installed in a duct along the fuselage to the aft airframe connection.
It is protected by a foil, is maintenance-free and cannot be exchanged.

	The main harnesses are connected to the fuselage tubes and are installed on top of the tubes to allow undisturbed unfolding.
	The softpack container is connected to the aircraft frame. The connection must withstand a load of at least 75 kp!
	The installation of the rocket can be seen on the picture. The activating housing must not be stretched, coiled or crimped! The rocket must hit the roof of the fuselage within the cap area when fired.

7.4. Flaps

The fowler flaps are operated electrically by pressing the switch in the direction desired. During flap operation all 3 indicator lights illuminate at the same time. Flaps stop automatically at the next position, indicated by the respective light or other means like EFIS / EMS.
Additionally there are markings at the flaps themselves to indicate the respective flap position. The system is protected by an overload clutch on the drive motor.
The flap motor might cause short disturbances on the radio.

Flap operation	Position 0 to 1	Position 1 to 2	Position 2 to 3
Time	3 s	3 s	5 s

7.5. Vortex Generators

By installing vortex generators acc. Service bulletin SB 014-02-2012 in front of the ailerons, the handling of the aircraft at low speed improve and the stall speed decreases. The versions with 96 ltr fuel capacity and the shortwing **must** be equipped with vortex generators (25 per wing). During preflight check, the number and condition of the vortex generators must be checked. The number of generators on left and right wing may differ by up to 2 units.

7.6. Tyres

Wheel	**Size**	**Pressure**
Main	6.00 x 4	2,4 to 2,9 bar
Nose	4.00 x 4	1,5 to 1,8 bar
Tail	120 mm	

7.7. Seats and Seatbelts

By pulling the handle beside the seat, the lock is released and the seat can be adjusted horizontally.
It must be assured that the seat is locked in the new position. The 4-point seatbelts can be adjusted to fit every size. The lock is released by pressing the red button.

7.8. Canopy

The canopy is locked by two handles, one on each side. Additionally there are emergency handles to allow unlocking the canopy from outside.

7.9. Engine

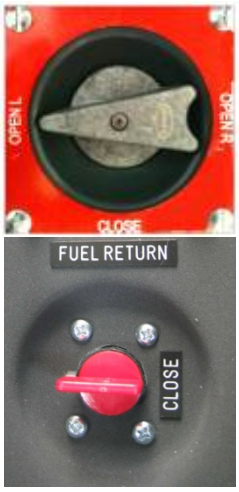
The FK 14 is powered by a ROTAX 912 four-cylinder, horizontally opposed engine. It has a combined cooling by liquid and air. The optional airbox allows to supply the carburetors with cold or preheated air to avoid carburetor icing.
There are 3 control levers for throttle, choke and carburetor heat located on the centre console.
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. Propeller

The propeller is a fixed pitch version, ground adjustable or a constant speed version. For details check the respective manual.

7.11. Fuel System

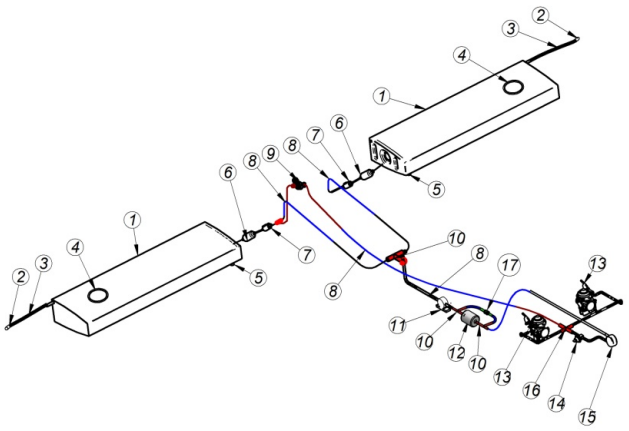
Both wings are equipped with fuel tanks. They are vented and have a fuel drain under the wing.
There is one mechanical fuel pump normally providing fuel to the engine. Additionally there is an electrical fuel pump which should be ON during takeoff and landing. The fuel valve is located at the center console with positions OPEN L / OPEN R and CLOSE.



During cruise flight the pilot has to switch to the fullest tank in intervals of not more than 60 minutes. The maximum difference between left and right tank shall not exceed 15 Ltr / 4 USG. For takeoff and landing the fullest tank has to be selected. ***Never perform a takeoff on a tank containing less than 10 Ltr / 2,6 USG!*** A fuel return line is installed to allow fuel not required by the engine to return to the right tank, if the respective valve is open. It is located at the aft part of the center console. After landing, the valve can be opened to reduce the overpressure / fuel vapor in the fuel system. This makes engine start easier. The valve must be closed during flight to avoid incorrect fuel flow indication and overfilling of the right tank.
Fuel quantity has to be checked before flight by means of a calibrated stick. As an option, an

electrical gauge is available. Due to the relatively thin wing, the indication is not very precise. Therefore the fuel required must be calculated very carefully during flight preparation.
When parking the aircraft in strong rain, it is recommended to secure the fuel caps from water entering by putting an extra cover on top of the cap. The same applies to the openings on top of the engine cowling.

FK-14 B2 Fuel system



1. *Wing tank*
2. *Venting*
3. *Plastic Tube ∅10*
4. *Fill cap*
5 *Drainage*
6. *Fuel filter*
7. *Quick fastener*
8. *Aluminium tube*
9. *Valve of return*
10. *Fuel selector valve*
11. *Fuel flow sensor*
12. *Electric fuel pump*
13. *Carburetor*
14. *Fuel pressure sensor*
15. *Mech, fuel pump*
16. *Clamp block*
17. *One-way valve*

Konstruował	Stanisław Karaś	2011-09-01		Klasa dokładn.	Masa	Powł. ochronna	Obróbka cieplna
Rysował	Paweł Harkot	2011-09-01		-	-	-	-
Sprawdził	Stanisław Karaś	2011-09-01		zastępuje rys. -			
Zatwierdził				zastąpiony rys.			
Skala	Ark.	Ilosc sztuk	Materiał	Nazwa		Nr rysunku	
1:1	2/2	.		FK-14. with wing tanks The fuel system+ bypass		FK14.	

7.12. Brakes

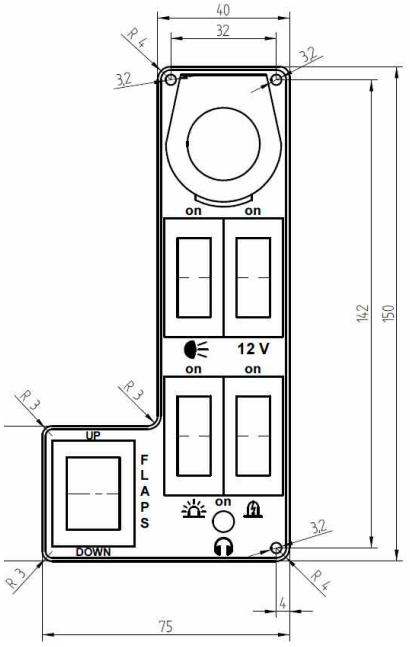
Brakes are controlled by a handle at the center console. Brakes are applied to both main wheels at the same time.
By closing a valve at the center console when pressure has been applied, the hydraulic brake can function as a park brake.
Optional for Italy, there is a system available with two handles for differential braking.

7.13. Heating and Ventilation

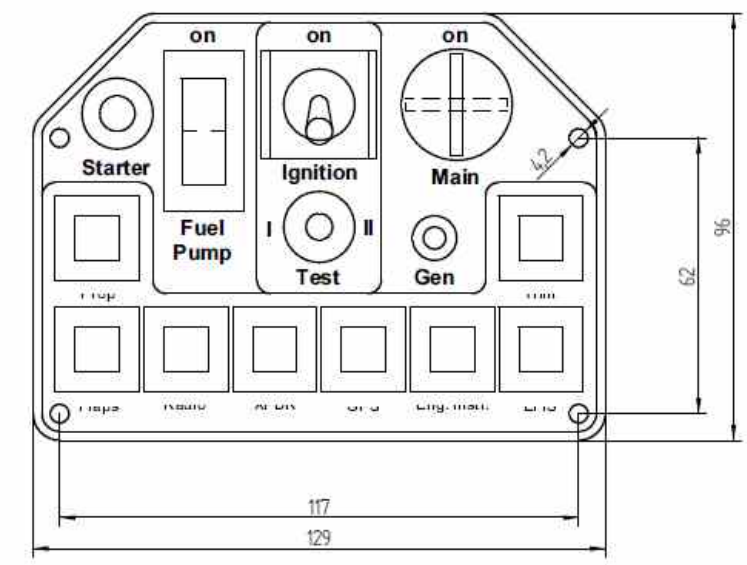
The FK 14 is optionally equipped with cabin heating. By pulling the lever on the center console, heated air is allowed to enter the cabin through the front of the pilot's feet. For summer operation, it is advisable to remove the heating tube in the engine compartment.
The cabin is ventilated by opening of the windows in the canopy or by using the dir vent in the instrument panel.

7.14. Electrical System

A detailed schematic of the electrical system is available under www.flugservice-speyer.de.
A 12V engine-driven alternator delivers the required electricity.
If the red generator control light lights up above 1800 RPM shut off all electrical consumers not required for flight as the battery is discharged now.
The electrical panel contains combined switches and circuit breakers.



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.



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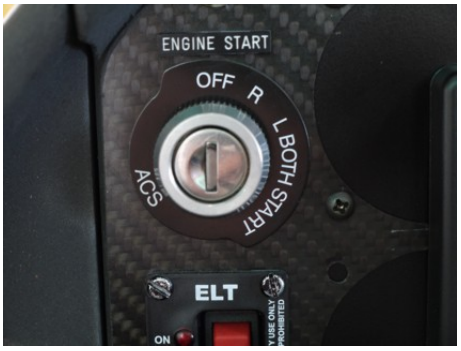
Optional Electrical System available in Italy

Circuit Breaker Panel:

Ignition Switch:



8. Handling, Servicing and Maintenance

8.1. General

Every owner of an FK 14 should maintain regular contact with 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. There are special lugs which can be attached to the lower side of each wing to tie down the aircraft, also tie down the nose- / tailwheel.
The aircraft should not be parked in wet conditions or exposed to UV radiation for a long period of time.
The canopy should be covered during parking to avoid getting dirty.
The FK 14 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 plenty 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 on the engine mount should be treated regularly with vaseline to prevent aging.
- Fuel lines, cables and bowden-cables must not be damaged.
- The flap actuator and drive shaft should be lubricated regularly, especially after flying in wet conditions.
- **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-aircraft.com or www.flugservice-speyer.de**

8.5. Regular Maintenance / Lubrication Schedule

Maintenance is due after certain flight hours or time intervals as applicable. There are some actions which must be performed for the first time after the very first 2 / 10 / 25 flight hours. The regular maintenance intervals are 25 / 100 / 200 / 500 flight hours or every year / every 2 / every 5 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
- recommended: engine overhaul according engine manual
- recommended: propeller overhaul according propeller manual

insert
maintenance schedule FK 14 Airframe
(DIN A4) here.

8.7. Airplane Servicing

8.7.1. Fuel

During refuelling smoking is prohibited. Connect the airplane to ground. Avoid fuel spill, drain as required. For fuel grades check section Limitations.

8.7.2. Oil

Before checking the oil quantity, turn the propeller in normal direction by hand (ignition must be switched OFF) until you hear the oil returning to the tank. Now check the oil level. For oil grades check respective engine manual.

8.7.3. Coolant

Check coolant level preferably with cold engine. For coolant types check respective engine manual.

8.8. Control Surface Angle

	Angle [°]	Tolerance [°]
Elevator		
Up	22	+0 / -1
Down	15	+3 / -3
Rudder		
Right	20	+0 / -1
Left	20	+0 / -1
Aileron		
Up	-19	+1 / -1
Down	+17	+1 / -1
Flaps		
Position 0	0	+3 / -2
Position 1	+10	+3 / -2
Position 2	+20	+3 / -2
Position 3	+32	+3 / -2

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:

- Drain liquids (oilsystem /coolingsystem / fuelsystem)

Additional for air transport:

- Remove complete engine (considered hazardous goods for air freight!)

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/carbon fibre composite)
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 be 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

Check fuselage and wings for loose or foreign objects. Bolts, linkages and connections should be well lubricated. The flaps must be fully up, therefore turn the flap drive manually until flaps are definitely up.

Dismantle all covers of the wing bolts. Set all bolts to the fully open position by using the respective handles. Now, the ***left*** wing can be mounted to the fuselage and the fuel line, electric cable and pitot tube must be connected.
After installation of the left wing, the left and right main bolt can be closed to the half-position.

Hint: do not force the bolts into position, if it does not close easily, change the V-position of the wing slightly. Do not close the bolts more than half way, otherwise you cannot install the second wing.

The ***right*** wing has to be installed in the same manner.
All bolts have to be closed now. Install the caps, they serve as a lock for the bolts. The gap between fuselage and wing has to covered by tape, otherwise tail vibration may occur.
With both seats in the aft position, there is access to the aileron connection through a cap in the seats. Connect the ailerons and secure the connection by Fokker-needles (s=1,0 – 1,2). Perform a check of ailerons and flap drive. With battery switch ON, none of the flap indicator lights must illuminate. After pressing the EXTEND button, the flaps must drive to position 1 and stop. The respective indicator light must illuminate. Check also position 2 and 3. Check for symmetric extension (flaps at the left and right wing in the same position).

Hint: the flap motor has a clutch to avoid electrical overloading. If you hear the clutch working, return the flaps to the last position and examine the problem.

After retracting the flap check them visually for synchronization.
To disassemble the aircraft follow above mentioned steps in reverse order.

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. Mühlbauer – Constantspeed Propeller

Chapter 2 Limitations:
The maximum allowable RPM must not be exceeded. Check the following table:

	takeoff	climb	cruise
Prop.-RPM	2380 RPM	2220 RPM	1800-2000 RPM
Manifold press.	27,5 inch/hg	27 inch/hg	23-25 inch/hg
Engine-RPM	5800 RPM	5500 RPM	4200-5000 RPM

Placards:
Prop.-Governor forward = takeoff / landing
Prop.-Governor aft = cruise

Chapter 3 Emergency Procedures:
In case of a propeller governor failure, the blades automatically revert to low pitch = high RPM. Do not exceed maximum RPM limits.

Chapter 4 Normal Procedures:
- Preflight inspection according to the manual Mühlbauer Propeller
- Engine start: throttle idle (depending on engine temperature), prop.-governor forward to takeoff position; after engine run-up cycle the prop.-governor 3-5 times from full forward to full aft positions to rinse the system and to check proper operation
- Takeoff: prop.-governor full forward = max. RPM
- Climb: reduce to 5500 RPM by twisting the prop.-governor to the left
- Cruise: reduce to desired RPM (4200 – 5000) by twisting the prop.-governor to the left
- Landing: select prop.-governor full forward (high RPM) when on final to be prepared in case of a go around

During cruise, select a desired RPM by using the prop.-governor. Power setting is achieved by setting the desired manifold pressure with constant RPM.
With the prop.-governor in the full forward position, the blades are in low pitch and the propeller behaves like a normal fixed propeller without a constant speed function.

Power setting:
Power is set by manifold pressure and engine RPM. The recommandations given in the engine manual must be observed. High manifold pressure and low engine revolutions are bad / dangerous for the engine.
To increase power, first increase RPM before increasing MAP.
To reduce power, first reduce MAP before reducing RPM.

9.6. Neuform / Helix – Constantspeed Propeller

Chapter 2 Limitations:
A manifold pressure indication must be available. The maximum allowable RPM must not be exceeded. Check the following table:

	Ground	T/O (5min)	climb	cruise
Manifold press.	full throttle	27,5 inch/hg	27 inch/hg	23-26 inch/hg
Engine-RPM	5500	5800	5500	4300-5000

Chapter 3 Emergency Procedures:
In case of a propeller governor failure, the blades automatically revert to low pitch = high RPM. Do not exceed maximum RPM limits.

Chapter 4 Normal Procedures:
- Preflight inspection according to the manual Neuform Propeller
- Engine start: throttle idle (depending on engine temperature), propeller low pitch
- run-up: increase RPM (4000) and change pitch to high, observe RPM drop; return to low pitch, observe RPM increase to start value
- Takeoff: propeller selector takeoff (low pitch)
- Climb: set desired RPM (max.5500)
- Cruise: reduce to desired RPM (4300 – 5000)
- Landing: select low pitch
- variable pitch propeller will produce high drag and allow steep approaches when set to “low pitch” for approach / landing. But the high decceleration of the airflow which is passing the propeller area will also reduce elevator efficiency. This can result in problems to flare the aircraft correctly before touchdown. Therefore the engine RPM should be kept at least 200 RPM above idle before starting the flare.

Power setting:
Power is set by manifold pressure and engine RPM. The recommandations given in the engine manual must be observed. High manifold pressure and low engine revolutions are bad / dangerous for the engine.
To increase power, first increase RPM before increasing MAP.
To reduce power, first reduce MAP before reducing RPM.

9.7. Version LeMans (open Cockpit)


The version “LeMans“ uses an open cockpit instead of the closed cannopy. Installation and handling of the open cannopy is similar the the closed one.

Chapter 2 Limitations:
no change

Chapter 3 Emergency Procedures:
no change

Chapter 4 Normal Procedures:
It is important that all loose equipment in the cockpit is secured prior takeoff. Especially charts and jackets must be safely stowed in order not to be blown out of the cockpit and jamm the elevator / rudder.
All occupants must pull their seatbelts tight, otherwise it might happen in turbulence that their head is outside the cannopy and the headset is pulled away.

9.8. ROTAX 912iS

Chapter 2 Limitations:
no change

Chapter 3 Emergency Procedures:
no change

Chapter 4 Normal Procedures:
Only the specials concerning the handling of the 912 iS are mentioned here.

Engine Start:

throttle	idle
LANE A+B	ON
Fuel Main	EON
Start Power Switch	press and hold
Starter	engage
Start Power Switch	release
Oil Pressure	check

Engine Check:

RPM	4000 RPM
LANE A+B	switch OFF separately, max drop 180 RPM
RPM	idle
LANE A	OFF red light illuminates (selfstest)
LANE A	ON
as soon as the light is OFF repeat the check for LANE B	
RPM	3000 RPM
Voltage Generator B	check: BAT voltage increases to charge voltage

for Takeoff and Landing:

Fuel Aux	ON

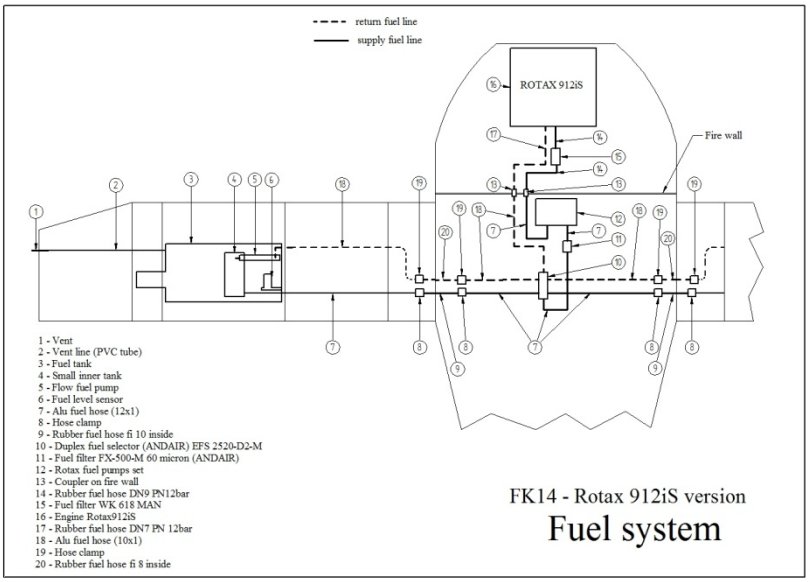
Chapter 5 Performance:
no change

Chapter 6 Weight & Balance:
no change

Chapter 7 Systems Description:
Only the specials concerning the handling of the 912 iS are mentioned here.

Instrument Panel:

Fuel System:



Fuel System:
After re-installation of the wings, the fuel system has to vented.

Electrical System:
The ROTAX 912iS has two generators. GEN A supplies exclusively the engine and GEN B supplies the aircraft network.

Chapter 8 Handling, Servicing and Maintenance :
no change

9.9. Airplane Flight Training Supplement

The FK 14 B is an easy to handle modern airplane.
There are no special training requirements beyond normal pilot's training.