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FLIGHT MANUAL and Maintenance Manual

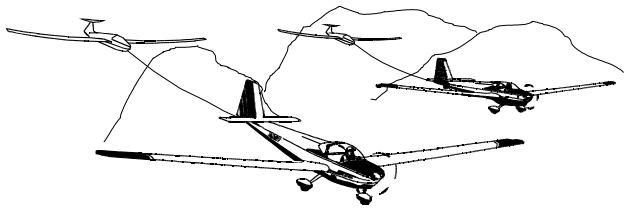
SF 25 C - FALKE

motorglider

ROTAX 912 **A** ( )
or
ROTAX 912 **S** ( )

maximum all-up weight **580 kg/ 610 kg/ 650 kg/ 690 kg**

MARCH 1997



Serial no:

Registration no:

Owner:

02. April 2009

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Pages 1 - 30 of this Flight Manual are EASA approved under
EASA.A.C. 11014 dated 02 April 2009
This manual is to be kept on board at all times

Revision status of manual

Serial no.	Title	Pages affected	Date	Signature
1	Version of manual - valid for all weight versions. Instructions for use of vacuum pump	Title page, insert, 4, 5, 7, 10, 12, 13, 15,16,18, 25, 26, 27, 28	22.01.1998	
2	Correction to propeller drawing for MTV21A-C-F/(CF)175-05	Title page, 4, 7, 20, 21, 25, 26	31.10.1998	
3	Additional engine ROTAX 912 S ( ) and editing change	Title page, insert, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 29	31.01.1999	
4	Following ROTAX SB 912-36R1, modification of procedure of power-setting for electr. Constant speed prop; Voltmeter instead of Ammeter	FM: Title page, 4, 8, 13, 16, 19, 26 MM: Title page, 10, 18, 19	15.01.2003	
5	New Cockpit canopy Electric Trim Servo with Position indication	FM: Title page, 4, 8, 11, 15, 24 MM: Title page, 2, 4, 15, 19, 21, 27, 28	20.05.2004	
6	Junction change of the push button switch with one piece canopy	FM: Title page, 4, 8, 16 MM: Title page, 18, 19	13.10.2005	
7	Increase of the MTOW and the max. weight of non-lifting parts	FM: Title page, 3, 4, 5, 6, 7, 9, 10, 23, 25, 27, 29, 30 MM: Title page, 2, 22, 23, 24, 25, 26, 27, 28, 29	20.01.2009	

The pilot is responsible for ensuring that the aircraft is operated in accordance with the Flight Manual.
The SF25C is authorised to carry a maximum of two adults.

The seating is side by side: the pilot sits on the port side.
The SF25C is ideal for training. For training purposes the instructor (P1) may sit on either side. All regulations must be observed.
The starboard control column may be removed for passenger flying.

1. Specifications and limitations

1.1. Engines

SF 25 C Engines	*ROTAX* 912 **A**(1)(2)(3)(4),	ROTAX 912 **S**(2)(3)(4)
Max. revs	5800 rpm	5800 rpm
Take off (full power) (max. 5 min)	Max. 5800 rpm 59.6 kW (82 PS/80bhp)	Max 5800 rpm 73.5 kW (100 PS/98bhp)
Cruise at	Max. 4800 rpm (63 PS/62bhp)	Max. 4800 rpm (72 PS/71bhp)
and additionally	22 ins manifold pressure (only for variable pitch propellers)	
Static rpm at full power	Min. 5000 rpm ± 100 rpm (Fixed pitch)	Min. 5600 rpm ± 100 rpm (Fixed pitch)
	5600 rpm ± 100 rpm	5600 rpm ± 100 rpm (Variable pitch, fine pitch)
Cylinder head temperature	max. 120°C	max. 120°C

1.2. Fuel

ROTAX 912 **A** ( )	ROTAX 912 **S** ( )
Min. **ROZ 90**	Min. **ROZ 95**
EN 228 Normal	----
EN 228 SUPER	EN 228 SUPER
EN 228 Super-Plus or AVGAS 100 LL	EN 228 Super-Plus or AVGAS 100 LL

Because of the higher lead content of AVGAS the valve seats are subjected to higher loads and there is increased carbon formation. Consequently AVGAS should only be used if there are vapour formation problems or if other types of fuel are not available. (see also Operating Manual for Rotax 912, section 10.2.2)

Fuel tank capacity
44 l (usable) or
55 l (usable) or
80 l (79 l usable)

1.3. Lubricants

Branded engine oils with gear additive

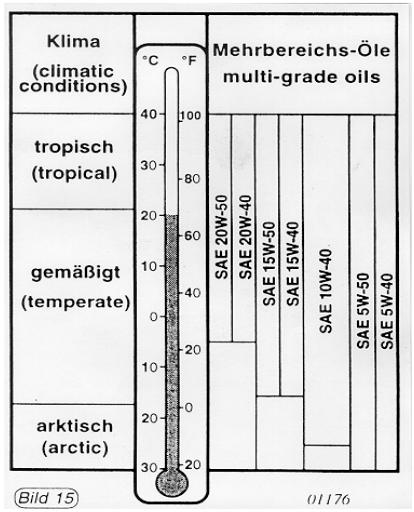
Never use unblended aviation engine oil.

Approved oils:

Use only API rated SF or SG oils. [Further details in Section 10.2.3) Lubricants in ROTAX 912 Operating Manual].

Synthetic & semi-synthetic oils should be used in preference as they are more temperature resistant and produce less residues.

□ NB: If AVGAS 100LL is used, the oil must be changed more frequently. See Service Information 18 UL 97.



Oil capacity 3.0 l (minimum 2.0 l)

Oil consumption max. 0.1 l/hr

Oil pressure	ROTAX 912 **A**( )	ROTAX 912 **S**( )
min.	0.8 bar (< 3500 rpm) [1.5 bar up to engine serial no. 4,410.266]	0.8 bar (< 3500 rpm)
normal	2.0 – 5,0 bar > 3500 rpm [1.5-5.0 bar up to engine serial no. 4,410.266]	2.0 – 5,0 bar > 3500 rpm
max.	maximum 7.0 bar Δ Warning: Permissible for short duration on cold starting.	

Oil temperature	ROTAX 912 **A** ( )		ROTAX 912 **S** ( )	
	min.	50°C	min.	50°C
	max.	140°C	max.	130°C

best operating temperature approx. 90°C - 110°C

1.4. Cooling system

Sealed cooling system with expansion and overflow vessel. The expansion vessel is sealed with a pressure cap (with excess pressure and blow valve).

Coolant: 50% antifreeze with anti-corrosion additives and 50% water, for all year round operation.

(see also ROTAX 912 Operating Manual, Section 10.2.1.)

1.5. Propeller

1) 2 blade fixed pitch
   a) Hoffmann *HO11AHM-165130* for ROTAX 912 **A(1), A(2)** and **A(4)**
   b) MT-Propeller *MT165R130-2A* for ROTAX 912 **A(1), A(2)** and **A(4)**
   c) MT-Propeller *MT170R135-2A* for ROTAX 912 **S(2)** and **S(4)**
   d) MT-Propeller *MT175R130-2A* for ROTAX 912 **S(2)** and **S(4)**

2) 2 blade variable pitch
   a) MT-Propeller *MTV1A/175-05* for ROTAX 912**A(2), A(4), S(2), S(4)**
   b) MT-Propeller *MTV21A-C-F/(CF)175-05* for ROTAX 912**A(3), S(3)**
   (factory setting of fine pitch for 912 **A** = 12° ± 0.2°
   for 912 **S** = 14° ± 0.2°, see propeller card)

Δ ROTAX 912 A + variable pitch propeller: Not for max. AUW of 580 kg Δ

Δ ROTAX 912 S + fixed or variable pitch propeller: Only for max AUW of 650/ 690 kg Δ

1.6. Engine instrumentation and markings

Rev counter

Starting range	0 – 1400 rpm	(yellow arc)
Normal operating range	1400 - 4800 rpm	(green arc)
Caution range	4800 -5800 rpm	(yellow arc)
Max. revs	5800 rpm	(red line)

Engine hours counter

The engine hours counter is a revolution counter. Irrespective of the actual rpm it counts 5000 revolutions as 1 minute of operation. The first three digits represent completed hours and the last two digits show values for 1/10 and 1/100 of an hour respectively. If an electronic rev counter without engine hours counter is in use, then there must be a separate engine hours counter.

Oil pressure gauge

Minimal operating range	0.8 - 2.0 bar	(yellow arc)
	0.8 – 1.5 bar	(for ROTAX 912 **A**, up to engine serial no. 4,410.266)
Normal operating range	2.0 - 5.0 bar	(green arc)
	1.5 – 5.0 bar	(for ROTAX 912 **A**, up to engine serial no. 4,410.266)
Permissible for short duration on cold starting	5.0 – 7.0 bar	(yellow arc)
Maximum oil pressure	7.0 bar	(red line)

Oil temperature gauge		ROTAX 912 **A**( )	ROTAX 912 **S**( )
Normal operating range	(green arc)	50°- 140°C	50°- 130°C
Minimum temperature	(red line)	50°C	50°C
Maximum oil temperature	(red line)	140°C	130°C

Cylinder head temperature

Maximum cylinder head temperature	ROTAX 912 A	ROTAX 912 S
(red line)	120°C	120°C

1.11. Connecting other consumers.

Further circuit breakers may be added to the terminal bar for additional consumers This applies to ACL, nav lights, VOR, transponder, encoder etc. It is important to ensure that the additional equipment is using the correct fuse rating.

The aircraft wiring system is 12 V DC, negative ground.
The appropriate regulations must be observed when fitting additional equipment.
The fuses on the firewall can be replaced with state of the art circuit breakers.
There is then no need for spare fuses and a visual check can be made to see which system has tripped out.

The appropriate regulations must be observed when fitting additional equipment.

1.12. Airspeed limitations and load factors

This table shows maximum airspeeds under different conditions:

	Speed		IAS		Comment
			Kph	knots	
V_{NE}	Maximum speed in calm conditions		190		Never exceed this speed. Control surface movements must be limited to one third travel.
V_{RA}	Maximum speed Rough air	max. weight **580/ 610 kg**	150		Do not exceed this speed except in calm air conditions and then only with caution. See Note 1.
		max. weight **650/ 690 kg**	160		
V_A	Manoeuvring speed	max. weight **580/ 610 kg**	150		See Note 2
		max. weight **650/ 690 kg**	160		
V_W	Winch launch speeds	max. weight **580/ 610 kg**	100		Only permissible with engine stopped
		max. weight **650 kg**	110		

Note 1: Rough air means conditions which may be encountered in wave rotor, cumulo nimbus clouds, whirlwinds and when flying over mountain ridges.

Note 2: At speeds in excess of V_A do not make full or abrupt control movements, as they could overstress the aircraft.

Airspeed indicator markings.

Marking		Speeds		Explanation
		kph	**knots**	
green arc	max. weight 580/ 610 kg	*80 -150*	**43-80**	Normal operating range, see Note 3
	max. weight 650/ 690 kg	*80 -160*	**43-86**	
yellow arc	max. weight 580/ 610 kg	*150 -190*	**80-102**	Caution range see Note 4
	max. weight 650/ 690 kg	*160 -190*	**86-102**	
red line		*190*	**102**	Maximum permissible speed for all operating modes
blue line	ROTAX **912 A**	*90*	**49**	Best rate of climb
	ROTAX **912 S**	*95*	**51**	
yellow triangle		*90*	**49**	Minimum approach speed at maximum weight

Note 3: The lower limit applies to maximum weight and most forward CG position. (V_{S1} is the minimum speed with spoilers extended)
The upper limit is the maximum rough air speed.

Note 4: In this range manoeuvres must be conducted with caution and only in calm air conditions.

Δ Warning: The following loads must not be exceeded when flying accurately:

With spoilers closed		
at manoeuvring speed:	(150 kph = 80 knots)	**+5.3g**
at maximum speed	(190 kph = 102 knots)	**+4.0g**
With spoilers extended		**+3.5g**

1.13. Weights

Empty weight (dependent on type of undercarriage and equipment)	approx. 400kg–450kg
Permissible load including fuel	approx. 200kg
Maximum permissible AUW (all up weight)	***)** 580kg/ 610kg/ 650kg/ 690 kg
Maximum weight of non-lifting components	***)** 430kg/ 450kg/ 490kg/ 530 kg

*) Delete as appropriate

See Maintenance Manual pp. 24 and 25

2.12. Wet wings – warning

The SF 25 C uses a modern glider wing section so it is sensitive to rain on the wings. The airflow over the wings is disturbed by the rain drops, which reduces the lift available. With dry wings the minimum speed is 38 knots, but with wet wings it is about 44 – 46 knots. The stall characteristics are also affected. With dry wings, the SF 25 C is good-natured in a stall, but with wet wings it can drop a wing. When flying in rain, always fly at speeds greater than 46 knots. When taking off with wet wings, never lift off at less than 46 knots. Climb and approach at about 57 knots. Avoid steep turns and other high g force manoeuvres. Any snow or ice/ white ice on the wings must always be removed before take-off. Don't forget to clean off the tailplane too.

2.13. Cold weather flying and risk of carburettor icing

At all times of the year and especially during the cooler seasons it is important to monitor that the engine oil temperature never drops below 70° C. Intermediate settings on the cowl flap (infinitely adjustable) are effective in controlling the cooling air reaching the engine. Always ensure that the maximum cylinder head temperature **never** exceeds 120°C (ROTAX 912 **A** and ROTAX 912 **S**).

2.14. Operating without outriggers

(only applies to single mainwheel undercarriage version)

The SF 25 C can also be operated without the outriggers fitted. You can taxi with a wing tip holder. At take-off an assistant must run with the wing tip until the ailerons become effective. When landing the SF 25 C can be held level with ailerons virtually until it has stopped.

2.15. Safety factors and engine reliability

Never forget that any motor glider engine is designed to simpler approval specifications than other aero engines. Consequently motor glider engines are simpler and cheaper, so always plan your route with safety in mind and maintain the necessary safety heights. You should always fly within gliding reach of a good field landing opportunity.

2.16. Attachment points for parachute static release

The static release cords for automatic parachutes are hooked on to the tubular member above the seat back near the red mark, port for the port seat and starboard for the starboard seat.

3. Performance data

The specifications in this section refer to the following propellers:
HO11AHM-165 130, MT165R130-2A, MT170R135-2A or MT175R130-2A
MTV1A/175-05 and MTV21A-C-F/(CF)175-05.

3.1. Take-off performance

These performance figures were obtained from type test results and can be reproduced provided that the motor glider and engine are in good condition and that the pilot is of average ability and skill

Maximum permissible AUW *)	580 kg	610 kg	650 kg	690 kg

*) Delete as appropriate

Level airfield with short grass in normal condition. Dry wings with a smooth surface. No wind conditions. Air pressure corresponding to normal pressure at airfield height.

Lift off speed approx. 38 knots,
Climb speed 49 – 51 knots.

For take-off from a hard surfaced runway all values may be reduced by about 5%	Airfield height above sea level		Air temperature at ground level in °C			
			-15	**0°C**	**+15°C**	**+30°C**
	m	**ft**	**m**	**m**	**m**	**m**
Take-off run in m up to lift off	*0*	**0**	105	122	***141***	160
	250	**820**	113	132	152	174
	500	**1640**	123	143	165	189
	750	**2460**	133	155	178	205
	1000	**3280**	145	168	193	221
Total take-off distance in m to clear 15 m obstruction	*0*	**0**	216	241	***268***	297
	250	**820**	229	255	285	315
	500	**1640**	242	271	303	334
	750	**2460**	257	288	320	362
	1000	**3280**	273	306	342	391

This table applies to all previously quoted engine/propeller combinations and to all aircraft weights. Values for ground run and take-off over a 15 m obstacle are the same as or better than those in the table for the variable pitch propeller and /or the ROTAX 912 **S** engine.

3.5. Glide performance

With engine stopped, cowl flap closed, clean wings and (if fitted) Variable pitch prop in glide configuration

Minimum rate of sink at 43 knots (single mainwheel undercarriage) 1.12 m/sec
Minimum rate of sink at 43 knots (two wheel undercarriage) 1.18 m/sec
Minimum rate of sink at 43 knots (tricycle undercarriage) 1.17 m/sec

Best glide at 49 knots (single mainwheel undercarriage) 1: 22
The values are improved somewhat when the variable pitch propeller is set to glide configuration.

4. Centre of gravity and weight limits

✪ Caution It is the responsibility of the pilot (P1) to ensure that the weight limits are observed.

4.1. Empty weight centre of gravity

Always ensure that the empty weight CG remains within the permitted limits, for example after major repairs, the installation of additional equipment or repainting. If necessary, ballast weights must be fitted. Should this occur, a suitably qualified inspector must be called in. Permitted empty weight CG range (see Maintenance Manual, pp 23-24).

Aircraft position: Wing chord at rib 6 (2.2 m / 86.61" from the centre line) = horizontal.
Datum: 2.0 m / 78.74" ahead of the leading edge of rib 0 (root rib), 0.52m / 20.47" from centre line.

If the empty weight CG is kept within the approved empty weight CG range, compliance with the loading chart will ensure that the flying weight CG will automatically remain within its permitted range.

4.2. Centre of gravity at flying weights

In flight the centre of gravity has a considerable influence on the handling qualities of the aircraft. For this reason it is of vital importance that the prescribed CG limits are scrupulously observed.
The following limits of CG flying weights have been tested and approved:
Applicable to: Flying weights of 580 kg, 610 kg, 650 kg and 690 kg.

max forward CG **2,143 m / 84.37" aft of datum**
max. aft position of CG: **2.334 m / 91.87" aft of datum**

7. Additional electrical fuel pump

(Optional version TM 653-51/ 2)
An additional electric fuel pump can be installed in the motor glider as an option. This can be used for added safety:

a) before starting the motor
b) for take-off
c) for the approach and the possibility of a touch and go
d) in flight when the fuel supply may be less reliable e.g. through vapour formation at altitude, during very hot weather and in particular when climbing steeply. In normal cruise the optional electric fuel pump can be switched off. When the additional fuel pump is switched on a special warning light comes on. Please note however that this does not give any indication of the actual fuel pressure.

8. Noise reduction requirements

Only German national noise limits for: SF 25 C with the following engine / propeller combinations	Max. flying weight	Section **X**			Section: **VI**		
		Noise limit for enhanced noise abatement		Calculated noise level	Noise limit for enhanced noise abatement		Calculated noise level
		Up to build date 31.12 1999	From build date 2000		Up to build date 31.12 1999	From build date 2000	
ROTAX **912 A(1), A(2)** or **A(4)** MT165R130-2A HO11AHM-165 130	580 kg	XXX	XXX	XXX	60.0 dB(A)	58.0 dB(A)	**50.4** dB(A)
	610 kg	XXX	XXX	XXX	60.1 dB(A)	58.1 dB(A)	**50.8** dB(A)
	650 kg	65.6 dB(A)	63.6 dB(A)	**60.7** dB(A)	60.7 dB(A)	58.7 dB(A)	**52.1** dB(A)
	690 kg	XXX					
ROTAX 912 **A(2)** or **A(4)** MTV1A/175-05	610 kg	64.9 dB(A)	62.9 dB(A)	**55.3** dB(A)			
	650 kg	65.6 dB(A)	63.6 dB(A)	**55.3** dB(A)			
	690 kg	XXX					
ROTAX 912 **A(3)** MTV21A-C-F/(CF)175-05	610 kg	64.9 dB(A)	62.9 dB(A)	**55.3** dB(A)			
	650 kg	65.6 dB(A)	63.6 dB(A)	**55.3** dB(A)			
	690 kg	XXX					

Only German national noise limits for: SF 25 C with the following engine / propeller combinations	Section X			
	Max. flying weight	Noise limit for enhanced noise abatement		Calcula-ted noise level
		Up to build date 31.12 1999	From build date 2000	
ROTAX 912 **S(2)** oder **S(4)** MT170R135-2A	650 kg	65,6 dB(A)	63,6 dB(A)	**55,4** dB(A)
	690 kg			
ROTAX 912 **S(2)** oder **S(4)** MT175R130-2A	650 kg			**55,6** dB(A)
	690 kg			
ROTAX 912 **S(2)** oder A(4) MTV1A/175-05	650 kg			**57,5** dB(A)
	690 kg			
ROTAX 912 **S(3)** MTV21A-C-F/(CF)175-05	650 kg			**57,5** dB(A)
	690 kg			

Enhanced German national noise abatement requirements will be met if the measured noise level is within the maximum values prescribed in Annex 2 of the airfield noise abatement regulation by the following amounts:

		in Section **VI**	in Section **X**
	for build date before 1 January 2000 by:	min. 4 dB(A)	min. 5 dB(A)
and	for build dates from 1 January 2000 by:	min. 6 dB(A)	min. 7 dB(A)

These values have been incorporated in the table above.