

Section 2 – Limitations

IMPORTANT NOTE

The Pilot's Operating Handbook for SE-MMJ has several supplements that add to or modify the basic limitation information. In order to help the pilot to find the correct and complete limitations, the aircraft owner has compiled this consolidated list of limitations using the basic POH and the POH supplements.

Only the original POH text is approved.

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2.1 Introduction

Section 2 contains operation limitation, instrument marking and basic placards necessary for safe operation of airplane and its engine, standard systems and equipment. Limitation for optional systems and equipment are stated in section 9 - Supplements.

2.2 Airspeed Limitation

Airspeed limitations and their meaning for operation are stated in the table below:

Airspeed		IAS	km/h IAS	Meaning
V _{NE}	Never exceed speed	146	270	Do not exceed this speed in any operation.
V _C	Design cruising speed	115	214	Do not exceed this speed, with exception of flight in smooth air, and even then only with increased caution.
V _A	Design maneuvering speed	90	167	Do not make full or abrupt control movement above this speed, because under certain conditions the airplane may be overstressed by full control movement.
V _{FE}	Maximum flap extended speed	70	130	Do not exceed this speed with the given flap setting.
V _{S0}	Stall speed	39	73	Flaps in 50° position at maximum take-off weight.

2.3 Airspeed Indicator Marking

Airspeed indicator markings and their color-code significance are shown in the table below:

Marking	Range		Meaning
	KIAS	km/h IAS	
Red line	39	73	V_{S0} at maxim weight (flaps in landing position 50°)
White arc	39 – 70	73 - 130	Operating range with extended flaps. Lower limit - V_{S0} at maximum (flaps in landing position 50°) Upper limit - V_{FE}
Green arc	42 - 115	78 - 214	Normal operating range Lower limit - V_{S1} at maximum weight (flaps retracted - 0°) Upper limit – V_C
Yellow arc	115 – 146	214 - 270	Maneuvers must be conducted with caution and only in smooth air
Red line	146	270	Maximum speed for all operations - V_{NE} .

2.4 Power Plant

Engine manufacturer:	BRP-Powertrain GmbH & Co KG	
Engine type:	ROTAX 912 S2	
Power:	max. take-off	73.5 kW / 100 HP
	max. continuous	69.0 kW / 93 HP
Engine speed:	max. take-off	5800 RPM max. 5 minutes
	max. continuous	5500 RPM
	idle	min. 1400 RPM
Coolant temperature:	maximum	120°C / 248 °F see Note on page 2-6
Oil temperature:	maximum	130°C / 266 °F
	optimum operation	90 - 110°C / 190 - 230°F
Oil pressure:	maximum	102 PSI / 7 bar (for short period admissible at cold start)
	minimum	0.8 bar / 12 PSI
	optimum operation	2 - 5 bar / 29 - 73 PSI
Fuel pressure:	maximum	5.8 PSI / 0.4 (0.5*)bar
	minimum	2.2 PSI / 0.15 bar
Fuel grades:	see para 2.13.2 Approved Fuel Grades	
Oil grades:	see para 2.14 Oil Limits	
Engine start, operating temperature		
	maximum	50°C / 120°F (ambient temperature)
	minimum	-25°C / -13°F (oil temperature)
Propeller manufacturer:	DUC Hélices Propellers	
Propeller type:	DUC SWIRL-3-L	
	3-blade, composite, on-ground adjustable	
Propeller diameter:	1730 mm / 68.11 in	
Propeller blade pitch:	22.2°+2°	

* Applicable only for fuel pump from S/N 11.0036

2.5 Power Plant Instrument Marking

The color-code of instruments is shown in the following table:

Instrument	Units	Red line	Green arc	Yellow arc	Red line
		Lower limit	Normal operation range	Caution range	Upper limit
RPM indicator	RPM	-	1400 - 5500	5500 - 5800	5800
Oil temperature indicator	°C	-	90 - 110	50 - 90 110 - 130	130
	°F	-	190 - 230	120 - 190 230 - 266	266
Oil pressure indicator	bar	0,8	2 - 5	0,8 - 2 5 - 7	7
	PSI	12	29 - 73	12 - 29 73 - 102	102
Fuel pressure	bar	0.15	0.15 - 0.4 (0.5*)	-	0.4 (0.5*)
	PSI	2.2	2.2 - 5.8	-	5.8
Coolant temperature see Note above	°C	-	-	-	120
	°F	-	-	-	248

* Applicable only for fuel pump from S/N 11.0036

2.6 Miscellaneous Instrument Marking

There are no other instruments with color marking.

2.7 Weight Limits

Maximum empty weight..... 405 kg
 Maximum take-off weight..... 600 kg
 Maximum landing weight..... 600 kg
 Maximum weight in baggage compartment..... 25 kg

2.8 Centre of Gravity

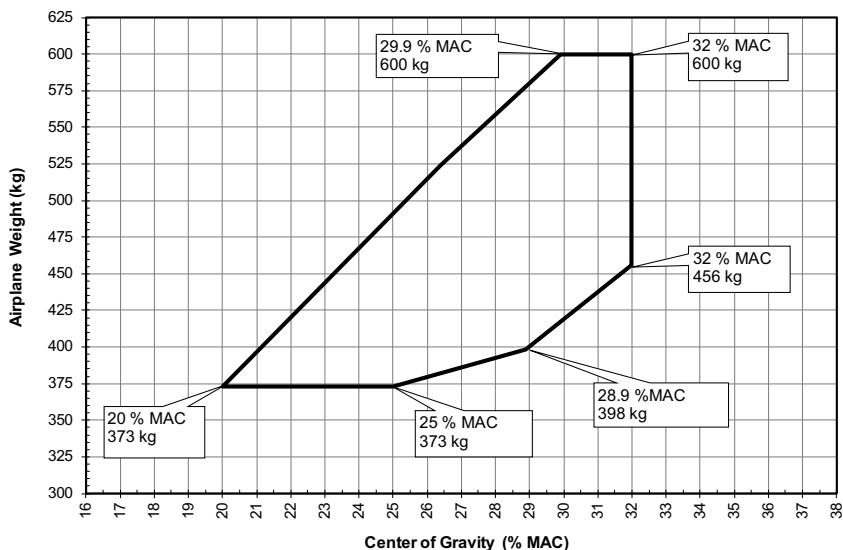


Figure 2-1 Centre of gravity

Reference datum is the wing leading edge.

WARNING

DO NOT EXCEED MAXIMUM WEIGHTS AND LIMITATION OF CENTER OF GRAVITY! THEIR EXCEEDING LEADS TO AIRPLANE OVERLOADING AND TO DEGRADATION OF FLIGHT CHARACTERISTICS AND DETERIORATION OF MANOEUVRABILITY.

2.9 Approved Maneuvers

SportStar RTC airplane is approved to perform the following maneuvers:

- Steep turns up to bank of 60°
- Climbing turns
- Lazy eights
- Stall (except for steep stalls)
- Normal flight maneuvers

WARNING

**AEROBATICS AS WELL AS INTENTIONAL SPINS
ARE PROHIBITED!**

2.10 Maneuvering Load Factors

Maximum positive load factor..... 4.0

Maximum negative load factor -2.0

2.11 Flight Crew

Minimum flight crew 1 pilot

Minimum weight of flight crew 55 kg

Maximum weight of flight crew see sec. 6, para 6.3

WARNING

**DO NOT EXCEED MAXIMUM WEIGHTS AND
LIMITATION OF CENTER OF GRAVITY! THEIR
EXCEEDING LEADS TO AIRPLANE
OVERLOADING AND TO DEGRADATION OF
FLIGHT CHARACTERISTICS AND
DETERIORATION OF MANOEUVRABILITY.**

2.12 Kind of Operation

The airplane is approved for VFR Day and VFR Night flights.

The following listing summarizes the equipment for approved operations required under Commission Regulation (EU) No 965/2012, Annex VII – Part NCO.

When flying VFR Night, external visual references are primary means of flying and cannot be replaced by instruments. Therefore, visual meteorological conditions are reasonably expected to be maintained for the entire duration of any VFR Night flight.

WARNING

FLIGHTS ACCORDING TO IFR AND INTENTIONAL FLIGHTS UNDER ICING CONDITIONS ARE PROHIBITED.

THE PILOT SHOULD ALWAYS MAINTAIN EXTERNAL VISUAL ATTITUDE REFERENCE!

THE PILOT SHOULD NOT RELY ON THE ATTITUDE INDICATOR FOR ATTITUDE EVALUATION!

THE PILOT SHOULD NOT FLY OVER AREAS WITH LIMITED VISUAL REFERENCE (E.G. ABOVE SEA)!

CAREFULLY CHECK THE WEATHER FORECAST ALONG THE ROUTE PRIOR TO TAKE-OFF.

GOOD VISIBILITY IS REASONABLY EXPECTED TO BE MAINTAINED FOR THE ENTIRE DURATION OF THE FLIGHT.

Instruments and equipment for Day / Night flights according to VFR:

Equipment	Kinds of operation	
	VFR Day	VFR Night
Communications		
VHF Transceiver	0	1
Electrical Power		
Battery 20 Ah	1	1
Backup battery for G3X system	1	1
External alternator	0	1
V/A indication on MFD	1	1
CHARGING red signaling light	1	1
AUX. CHARGING red signaling light	0	1
Switches, circuit breakers	Acc. to system needs	Acc. to system needs
Equipment and Furnishing		
Safety harness for every used seat	2	2
ELT	1	1
Emergency hammer	1	1
First-aid kit	1	1
Fire Protection		
Fire extinguisher	1	1
Flight Control		
Pitch trim indicator on MFD	1	1
Flap position indicator on MFD	1	1
Fuel System		
El. fuel pump	1	1
Fuel quantity indication on MFD	2	2
Fuel pressure indication on MFD	1	1
Manifold pressure indication on MFD	1	1
Lighting		
Anti-collision lights	2	2
Position lights	0	2
Landing light	0	1
Taxi light	0	1
Instrument lighting	0	1
Instrument panel lighting	0	1
Cabin lighting	0	1
Flashlight	0	2
Navigation and Pitot-static		
Airspeed indication on PFD	1	2
Backup airspeed indicator (optional)	*	*
Sensitive barometric altimeter on PFD	1	2
Backup altimeter (optional)	*	*
Magnetic compass	1	1
Attitude indication on PFD	1	2
Turn and slip on PFD	1	2
Vertical speed on PFD	1	2

Equipment	Kinds of operation	
	VFR Day	VFR Night
Stabilized heading on MFD	1	2
Clock	1	1
Stall warning system	1	1
Pitot-static tube with heating indication on MFD	1	1
Transponder with altitude encoding	1	1
Powerplant		
Coolant temperature indication on MFD	1	1
RPM indication on MFD	1	1
Oil temperature indication on MFD	1	1
Oil pressure indication on MFD	1	1
EGT indication on MFD	1	1
EMS red signaling light	1	1
Miscellaneous equipment		
New engine cowlings	0	1
Glareshield on instrument panel	0	1
* According to airplane configuration		

CAUTION

APPROPRIATE NATIONAL REGULATIONS FOR OPERATION CAN REQUIRE OTHER FUNCTIONAL EQUIPMENT.

2.13 Fuel Limits

2.13.1 Fuel Capacity

Fuel tank capacity (each)	60 l
Total fuel capacity	120 l
Total usable fuel	118 l
Total unusable fuel	2 l (1 l per tank)

NOTE

It is not recommended to fully tank the fuel tanks. Due to fuel thermal expansions keep about 8.0 liters of free space in the tank to prevent fuel bleed through the vents in the wing tips. This should be adhered especially when cold fuel from an underground tank is tanked.

2.13.2 Approved Fuel Grades

Automotive gasoline with octane index min. RON 95 (or anti-knock index min. AKI 91) meets the following standards:

- Europe– EN 228 Super, EN 228 Super plus
- Canada– CAN/CGSB-3.5 Quality 3
- USA– ASTM D4814
- Russia- R51866-2002

Aviation gasoline:

- AVGAS 100 LL aviation fuel according to ASTM D910.
- AVGAS UL91 (unleaded) aviation fuel according to ASTM D7547.

CAUTION

APPROVED AND UP TO DATE FUEL GRADES ARE STATED IN THE ACTUAL ISSUE OF SERVICE INSTRUCTION SI-912-016.

NOTE

AVGAS 100 LL places greater stress on the valve seats due to its high lead content and forms increased deposits in the combustion chamber and leads sediments in the oil system. Thus it should only be used when automotive gasoline is unavailable.

Risk of vapor formation if using winter fuel for summer operation.

2.14 Oil Limits

Performance classification SG or higher according to API.

Oil volume:

- minimum 2.5 l (min. mark on the dip stick)
- maximum 3.0 l (max. mark on the dip stick)

CAUTION

RECOMMENDED OIL GRADES ARE STATED IN THE ACTUAL ISSUE OF SERVICE INSTRUCTION SI-912-016.

2.15 Maximum Number of Passengers

Maximum number of passengers including pilot.. 2

2.16 Electrical System Limitations**2.16.1 Pitot-Static System**

Maximum time of heating Pitot-static tube on the ground must not exceed 30 sec.

2.16.2 Garmin GTR 225A VHF COMM Radio

The Garmin GTR 225/225A/225B Pilot's Guide, P/N 190-01182-00 (revision A or later) must be available to the flight.

If the microphone is keyed for longer than 35 sec, the GTR 225 will return to the receive mode on the selected frequency.

NOTE

A "Stuck Mic" message will display until the transmit key is released. Alerts will display until the error clears or the user acknowledges it.

2.16.3 Garmin GTX 335 ATC Transponder

The Garmin GTX 335/345 All-In-One ADS-B Transponder Pilot's Guide, P/N 190-01499-00 (revision F or later) must be available to the flight.

2.16.4 AIR Traffic AT-1

1. AT-1 does not protect the airplane from collisions with other air traffic or obstacles. It only serves as an aid to the flight crew and intends to help recognizing threats and thus increasing situational awareness.
2. AT-1 is not capable of detecting the entire air traffic and all obstacles that may obstruct the airplane's flight path. Only a fraction of the air traffic and a fraction of obstacles in some areas of the world can be detected.
3. AT-1 does not work all the time. Certain requirements need to be met for AT-1 to work properly. Examples are up-to-date software or the correct installation of AT-1, its antennas, and connected systems.
4. Errors and failures in the device may occur. It is possible that AT-1 fails during operation. It is possible that AT-1 shows misleading and/or wrong information to connected cockpit systems and/or to other airplanes. Never absolutely rely on data given by AT-1.
5. Pilot's Manual, doc. No. MAN0070A0002, Version 4.0, date 2020/01/09 or later valid version must be available to the flight.

CAUTION

DEVICES NOT UPDATED ONTO THE ACTUAL FLARM SOFTWARE WILL NOT BE DISPLAYED TO AND ALSO GET NO DISPLAY OF OTHER FLARM TARGETS!

DO NOT FLY WITH AT-1 IF YOU ARE UNFAMILIAR WITH ITS USE AND LIMITATIONS.

DO NOT MAKE SAFETY CRITICAL DECISIONS BASED ON DATA FROM A T-1 ALONE.

2.17 Other Limitations

2.17.1 Garmin G3X Touch

G3X Touch Pilot's Guide – Doc. No. 190-01754-00 Rev. H, dated December 2016 or latest valid issue must be carried on-board the airplane at all times.

2.17.2 Smoking

SMOKING IS PROHIBITED on the airplane board.

2.18 Limitation Placards

The following placards are located on the titling canopy:

Valid for Klassic 170/3/R propeller and DUC SWIRL-3 L propeller

This Light Sport Aircraft has been approved for VFR day / night flights under no icing conditions. Use GPS system for situational awareness only. The pilot should always maintain external visual reference!

Aerobatics and intentional spins are prohibited!

AIRSPEED IAS	
Never exceed V_{NE}	146 kts
Design Manoeuvring V_A	90 kts
Max. Flap Extended V_{FE}	70 kts
Stalling V_{SO}	39 kts

ENGINE SPEED	
Max. Take-off (max. 5 min.)	5800 rpm
Max. Continuous	5500 rpm
Min. Idling	1400 rpm

Unusable quantity of fuel 2 litres

This Light Sport Aircraft has been approved for VFR day / night flights under no icing conditions. Use GPS system for situational awareness only. The pilot should always maintain external visual reference!

Aerobatics and intentional spins are prohibited!

AIRSPEED IAS	
Never exceed V_{NE}	270 km/h
Design Manoeuvring V_A	167 km/h
Max. Flap Extended V_{FE}	130 km/h
Stalling V_{SO}	73 km/h

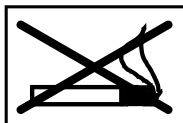
ENGINE SPEED	
Max. Take-off (max. 5 min.)	5800 rpm
Max. Continuous	5500 rpm
Min. Idling	1400 rpm

Unusable quantity of fuel 2 litres

LOAD LIMITS						
Max.take-off weight		600	kg			
Empty weight		335	kg			
Max.baggage weight		25	kg			
PERMITTED CREW WEIGHT				[kg]		
Fuel quantity ltr.		120	100	75	50	25
Baggage weight	max. 25 kg	154	168	186	204	222
	1/2 12 kg	167	181	199	217	235
	0 baggage	179	193	211	229	247
Fuel reserve (1/8 on the fuel indicator)		8 litres				

AIR Traffic AT-1 TAS is only to be used as an aid to situational awareness.

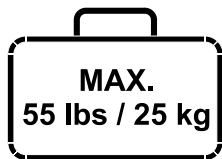
The following placards are located on the instrument panel



**BEFORE TAKE-OFF PUSH CANOPY HANDLE UP
TO CHECK CANOPY FULL CLOSING**

Placard color: red.

The following placards are located in the baggage compartment:



Placard color: green.



Placard color: red.



Located on the cover in the baggage compartment.

The following placard is located on the left and right side of the canopy frame:



NOTE

Other placards and labels are shown in Airplane Maintenance Manual for SportStar RTC airplane.