

# Flight manual for aeroplane VL-3A-3



*This flight manual is only for information and can not be use for any  
airplane operations!*

Registration number :

Serial number : VL -3-XX

Date : DD.MM.YYY

# Flight manual for aeroplane VL-3A-3

## 1. General

### 1.1 Introduction

This Flight Manual provides information useful for the safe and efficient operation of VL-3 aeroplane.

It also contains supplemental data supplied by the aeroplane manufacturer.

### 1.2 Warnings, cautions and notes

The following definitions apply to warnings, cautions and notes in the flight manual.

#### **Warning**

Means that the non-observation of the corresponding procedure leads to an immediate or important degradation of the flight safety.

#### **Caution**

Means that the non-observation of the corresponding procedure leads to a minor or to a more or less long term degradation of the flight safety.

#### *Note*

Draws the attention of any special item not directly related to safety but which is important or unusual.

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## 1.3 Descriptive data

### 1.3.1 Aeroplane description

VL-3 aeroplane is intended for recreational and cross-country flying. It is not approved for aerobatic operation.

VL-3 is a single engine, composite aeroplane with two side-by-side seats. The aeroplane is equipped with retractable tricycle landing gear with a steerable nose wheel. The fuselage is a carbon shell with carbon/kevlar seats integrated

The wing is a monospar construction with a sandwich skin composed of two layers of carbon and special foam. Control surfaces and empennage is of the same construction.

The aeroplane is controlled by dual push-pull control system, only rudder drive is controlled by cable. The ailerons and elevator are controlled by the control stick located between the pilot's legs (co-pilot's). The rudder is controlled by the rudder pedals, flaps are manually operated by a control lever located between the pilots on the fuselage main spar.

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## 1.3.2 Basic Technical data

### *Wing*

span .....	8.44 m
area of wing .....	9.8 m <sup>2</sup>
M.A.C. ....	1,236 m
loading .....	46 kg/m <sup>2</sup>

### *Ailerons*

area .....	0.207 m <sup>2</sup>
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### *Flaps*

area .....	0.8 m <sup>2</sup>
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### *Fuselage*

length .....	6,2 m
width .....	1.15 m
height .....	1,5 m

### *Horizontal tail unit*

span .....	2.68 m
area .....	1.69 m <sup>2</sup>
elevátor area .....	0.73 m <sup>2</sup>

### *Vertical tail unit*

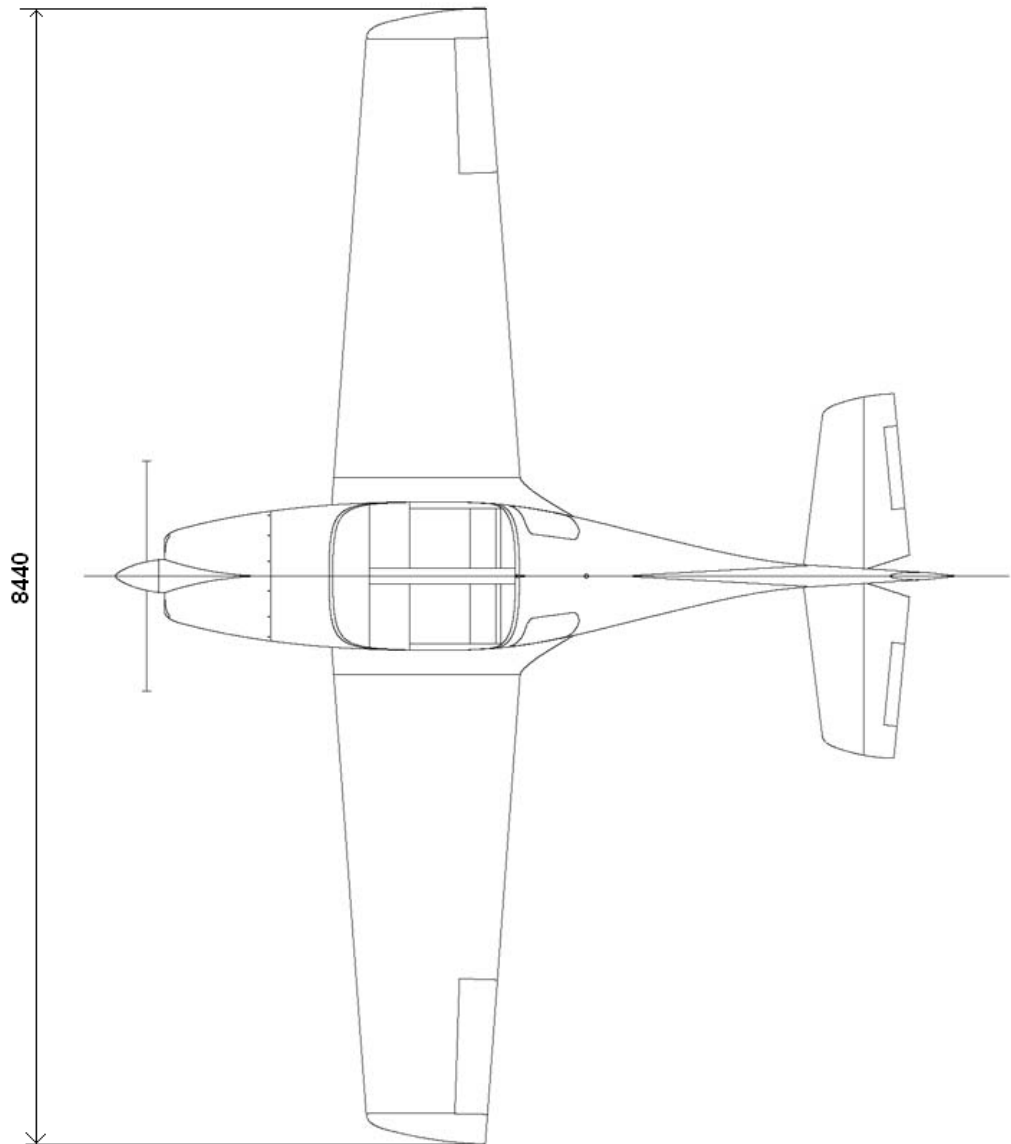
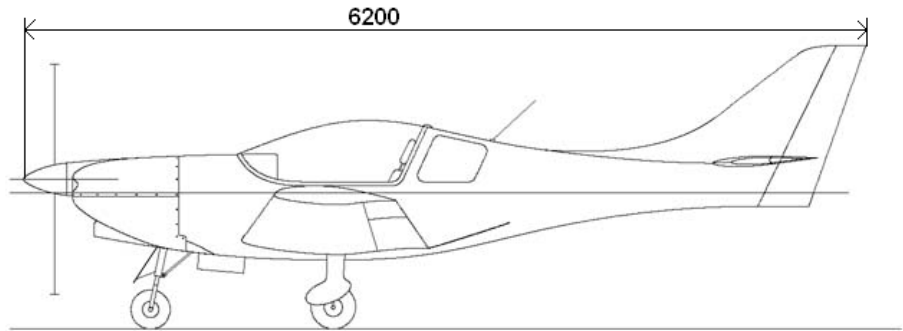
height .....	1,03 m
area .....	0.876 m <sup>2</sup>
rudder area .....	.0.309 m <sup>2</sup>

### *Landing gear*

wheel track .....	1.83 m
wheel base .....	1.285 m
main wheel diameter .....	0.35 m
nose wheel diameter .....	0.3 m

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1.4 Two-view drawing



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## 2. Limitations

### 2.1 Introduction

Section 2 includes Operating limitations, instrument markings, and basic placards necessary for safe operation of the aeroplane, its engine, standard systems and standard equipment.

### 2.2 Airspeed

Airspeed limitations and their operational significance are shown below:

Airspeed		IAS [km/h]	Remarks
$V_{NE}$	Never exceed speed	305	Do not exceed this speed in any operation.
$V_A$	Manoeuvring speed	165	Do not make full or abrupt control movement above this speed, because under certain conditions the aircraft may be overstressed by full control movement.
$V_{NO}$	Maximum structural cruising speed	210	Do not exceed this speed except in smooth air, and then only with caution.
$V_{FE}$	Maximum flap extension speed	120	Do not exceed this speed with flaps extended
$V_{LE}$	Maximum landing gear extension speed	150	Do not exceed this speed with undercarriage extended

### 2.3 Airspeed indicator markings

Airspeed indicator markings and their colour-code significance are shown below:

Marking	Range or value [IAS km/h]	Significance
White arc	55 - 120	Positive Flap Operating Range
Green arc	75 - 210	Normal Operating Range
Yellow arc	210 - 305	Manoeuvres must be conducted with caution and only in smooth air.
Red line	305	Maximum speed for all operations.

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### 2.4 Powerplant

Engine Manufacturer : Bombardier-Rotax GMBH

Engine Model : Rotax 912 ULS

Power :

Max. Take - off : 73.5 kW / 100 hp

Max. Continuous : 69 kW / 95 hp při 5500 rpm

Cruising : 66 kW / 90 hp při 4800 rpm

Engine RPM :

Max. Take-off : 5800 ot/min max 5 min

Max. Continuous : 5500 ot/min

Cruising : 4800 ot/min

Idling : 1400 ot/min

Cylinder head temperature:

Minimum : 60 °C

Maximum : 135 °C

Oil temperature:

Minimum : 50 °C

Maximum : 130 °C

Optoperating : 90 °C - 100 °C

Fuel pressure (if the fuel gauge and sensor are instaled) :

Minimum : 0,15 bar

Maximum : 0,40 bar

Fuel : viz. 2.13

Druh oleje (refer to engine Operator's Manual).

#### **Warning**

This engine has not been certified as an aircraft engine and its failure may occur at any time. The pilot is fully responsible for consequences of such a failure.

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### 2.5 Engine instrument markings

Function	Minimum Limit	Normal Operating Range	Caution Range	Maximum Range
Engine speed (RPM)	1400	1400-5500	5500-5800	5800
Cylinder Head Temperature (CHT) [°C]	60	60-100	100-135	135
Oil Temperature [°C]	50	90-110	110-130	130
Oil Pressure [bar]	1	1,5 – 5,0	5,0 – 7,0	7,0 cold engine starting

### 2.6 Miscellaneous instrument marking

#### Fuel Level Indication

Used floater fuel indication system does not allow to indicate exact fuel level in whole range (the floater contacts the upper wall of the tank before the tanks is filled full). From this reason the following states of fuel in the tanks are recognised:

	Left tank		Right tank	
	Liter	U.S.gallon	Liter	U.S.gallon
Full tank	60	15.8	59	15.6
Upper indicating limit	45	11.9	45	11.9

The following colour ranges are marked in EMS diagrams for both tanks:

	minimum		maximum	
	Liter	U.S.gallon	Liter	U.S.gallon
Green range	15	4	maximum	
Yellow range	7	1.8	15	4
Red range	0	0	7	1.8

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**2.7 Weight**

Empty weight (standard equipment) ..... 319 kg

*NOTE*

Actual empty weight is stated in SECTION 6, par. 6.2

Max. take-off weight ..... 472.5 kg

Max landing weight ..... 472.5 kg

Max. baggage weight ..... 15 kg

**2.8 Centre of gravity**

Empty aeroplane C.G. position (undercarriage retracted).... 17,1 %SAT

Empty aeroplane C.G. position (undercarriage extended).... 15 %SAT

Operating C.G. range ..... 21 - 34 %SAT

**2.9 Approved manoeuvres**

Aeroplane Category: NORMAL

The aeroplane is approved for Normal and Manoeuvres listed below:

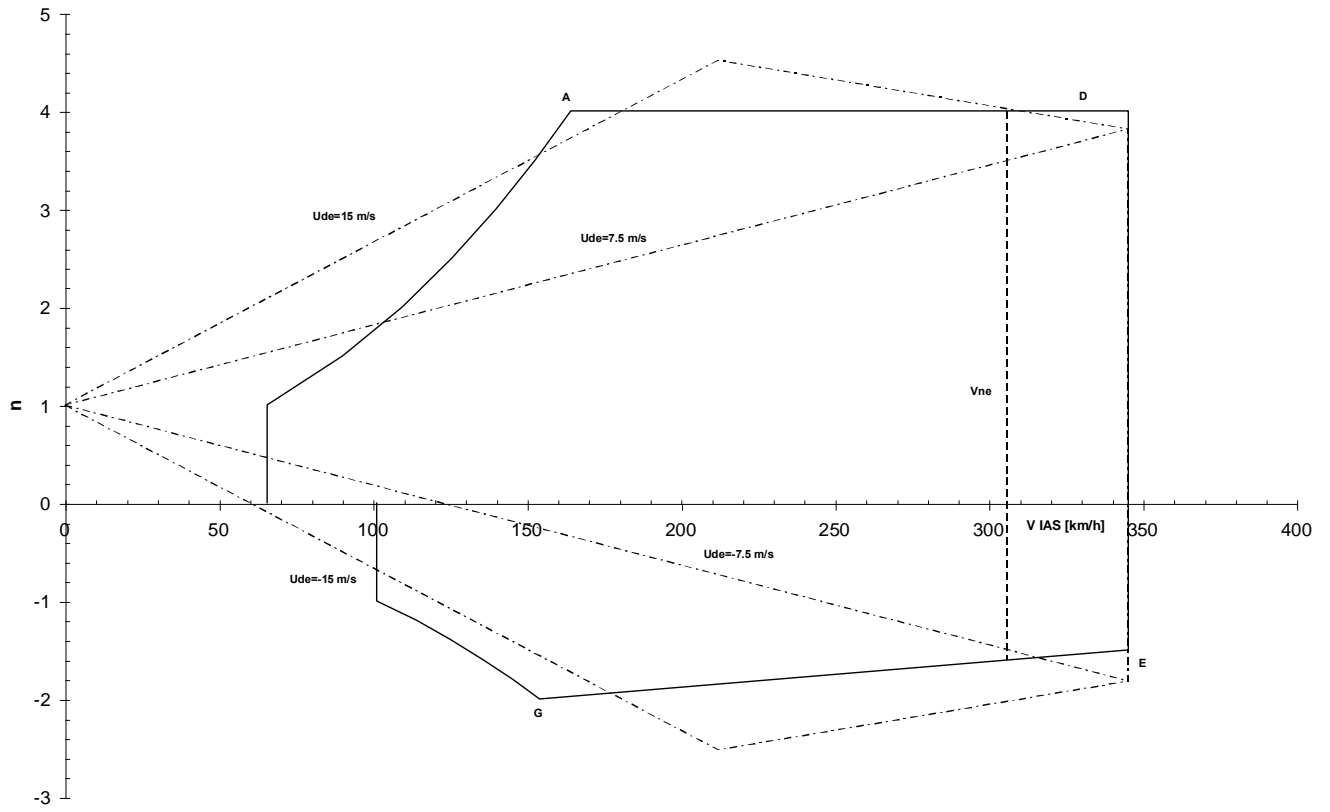
- Steep turn not exceeding 60° bank

**Warning**

Aerobatics, intentional spins and stalls  
are prohibited!

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## 2.10 Manoeuvring load factors



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## 2.11 Crew

Numer of seats.....	2
minimum crew weight .....	65 kg
maximum crew weight .....	see. 6.2

### Warning

Never exceed Maximum Take-off Weight

## 2.12 Kinds of operation

Day VFR flights only.

Instruments and equipment for VFR flights:

- 1 Airspeed indicator (marked according to 2.3)
- 1 Altimeter
- 1 Vertical speed indicator
- 1 compass
- 2 Safety harnesses

## 2.13 Fuel

- automotive premium grade gasoline, leaded, according to DIN 516000,Ö-NORM C 1103
- EUROSUPER RON 95 unleaded accord. to DIN 51607,Ö-NORM 1100
- AVGAS 100 LL
- Due to higher lead content in AVGAS, the wear of valve seats and deposits in the combustion chamber will increase. Therefore, use AVGAS only if other fuel types are not available.
- BA 95 Natural is recommended for Czech Republic

For other suitable fuel types refer to the engine Operator's Manual

## 2.14 Other limitations

- No smoking aboard the aeroplane.

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**2.15 Limitation placards**

**Caution**

The owner (aeroplane operating agency) of  
this aeroplane is responsible for placards readability  
during aeroplane service life.

<b>EMPTY WEIGHT</b>	<b>319 KG</b>
<b>MAX. TAKE-OFF WEIGHT</b>	<b>472 KG</b>
<b>MIN. CREW WEIGHT</b>	<b>65 KG</b>
<b>MAX. BAGGAGE WEIGHT</b>	<b>15 KG</b>

<b>NEVER EXCEED SPEED</b>	<b>VNE= 305 KM/H</b>
<b>MANOEURING SPEED</b>	<b>VA =165 KM/H</b>
<b>DESIGN CRUISING SPEED</b>	<b>VC =210 KM/H</b>
<b>MAX. LANDING GEAR EXTENSION SPEED</b>	<b>VLE =150 KM/H</b>
<b>MAX. FLAP EXTENSION SPEED</b>	<b>VFE =120 KM/H</b>
<b>STALL SPEED</b>	<b>VS0 = 55 KM/H</b>

<b>Power</b>	<b>RPM</b>	<b>manifold pressure</b>
	<b>[1/min]</b>	<b>[in Hg]</b>
Take-off	5800	27.5
continuing	5500	27
75%	5000	26
65%	4800	26
55%	4300	24

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## 5. Performance

### 5.1 Introduction

Section 5 provides approved data for airspeed calibration, stall speeds and take-off performance and additional information.

The data in the charts has been computed from actual flight tests with the aeroplane and engine in good condition and using average piloting techniques.

If not stated otherwise the performance data given in this section is valid for max. takeoff weight and under International Standard Atmosphere (ISA) conditions

### 5.2 Performance

#### 5.2.1 Airspeed indicator system calibration

IAS	EAS	IAS	EAS
[km/h]	[km/h]	[kts]	[kts]
57	65	31	35
70	78	38	42
80	87	43	47
100	108	54	58
120	125	65	67
140	142	76	77
160	160	86	86
180	179	97	96
200	198	108	107
220	218	119	118
240	238	130	128
260	258	140	139
280	278	151	150
300	297	162	160
305	302	165	163

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### 5.2.2 Stall speeds

Stall	Flaps position	Engine Power	Stalling Speed	
			IAS [km/h]	CAS [km/h]
Wing level stall	RETRACTED	idling	75	82
	"TAKE-OFF"	idling	65	73
	"LANDING"	idling	55	65

### 5.2.3 Take-off performance

Take-off distances stated in the following table are valid at sea level.

	Take-off run distance [m]	Take-off distance over 15 m obstacle [m]
Grass	150	280

### 5.2.4 Landing

Landing distances stated in the following table are valid at sea level.

	Landing distance over 15 m obstacle [m]	Landing run distance (full braking) [m]
Grass	270	100

### 5.2.5 Climb performance

Best Rate-of-climb speed is 130 km/h IAS, corresponding Rate of climb is 6,5m/s

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### 5.3 Additional information

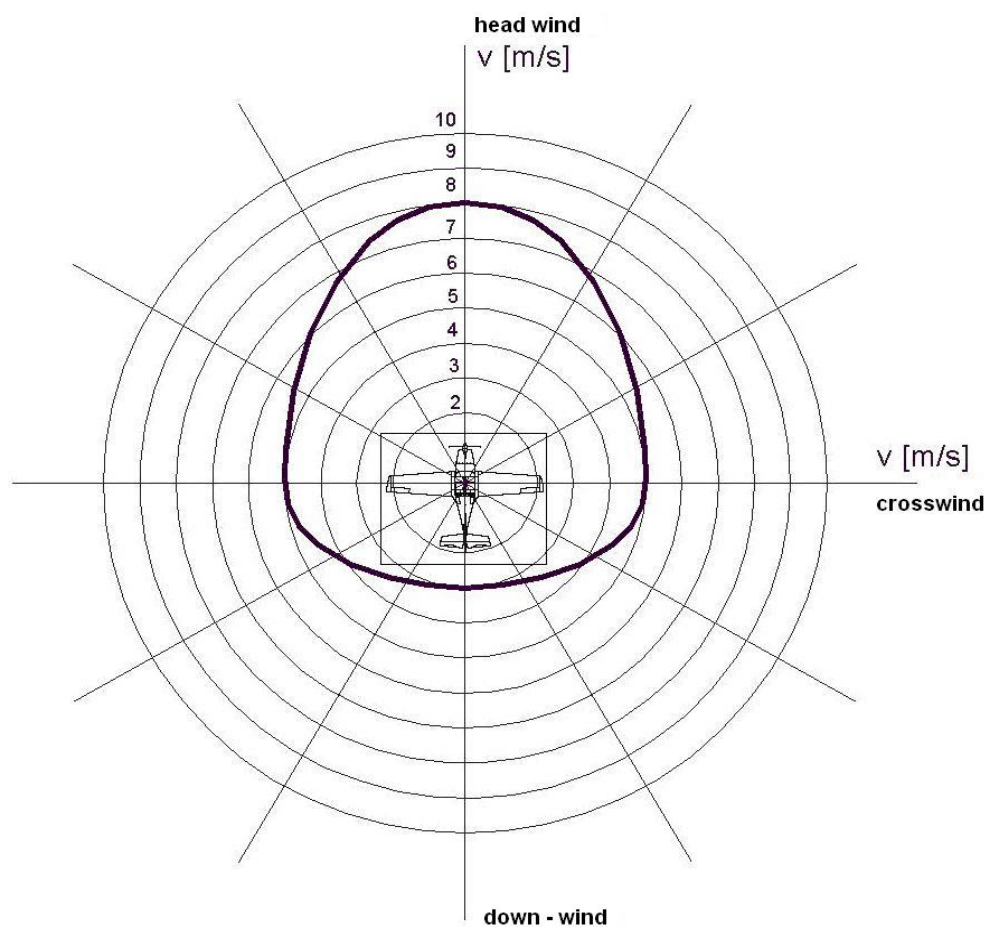
#### 5.3.1 Cruise

Regime	Economy Cruise	Max. Continuous Power	Max. Take-Off Power
Time limitation	unlimited	unlimited	max. 5 min.
Engine speed	4300	5500	5800
manifold pressure [inHg]	24	27	27.5
IAS [km/h]	210	260	280

#### 5.3.2 Demonstrated crosswind performance

Max. permitted cross wind velocity for take-off and landing 5 m/s

Max. permitted head wind velocity for take-off and landing 8 m/s



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## **7. Aeroplane and Systems Description**

### **7.1 Introduction**

This section provides description and operation of the aeroplane and its system.

Refer to Section 9, Supplements, for details of optional systems and equipment.

### **7.2 Airfram**

VL-3 airframe is all-carbonfibre monocoque construction

#### **7.2.1 Fuselage**

All composite sandwich construction.

#### **7.2.2 Wing**

The composite wing has one main spar with carbon flanges, no ribs; the stressed skin is of sandwich construction with a foam core.

#### **7.2.3 Horizontal Tail Unit (HTU)**

HTU has same construction like wing.

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### 7.3 Instrument panels and controls in the cockpit



- |    |                       |    |                                   |
|----|-----------------------|----|-----------------------------------|
| 1  | Rudder pedals         | 14 | Airspeed indicator                |
| 2  | Control stick         | 15 | Landing gear control              |
| 3  | Flaps control         | 16 | Turn-indicator                    |
| 4  | Throttle              | 17 | Comm                              |
| 5  | Trim control          | 18 | Transponder                       |
| 6  | Fuel tanks valve      | 19 | Garmin 695                        |
| 7  | Choke                 | 20 | 12V socket                        |
| 8  | Heating + ventilation | 21 | Engine hours meter                |
| 9  | Battery switch        | 22 | Circuit breakers                  |
| 10 | Charging pilot-light  | 23 | Emergency release of landing gear |
| 11 | D700                  | 24 | Parking brake                     |
| 12 | Magnetos+starter      | 25 | Rescue parachute                  |
| 13 | Switches              | 26 | Compass                           |

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### 7.4 Landing gear

The plane has a tricycle retractable landing gear with a nose wheel. The main fibreglass legs, main wheel size 350x100, hydraulically operated brakes. The steer able nose wheel of 300 x 100 size has a shock absorber and is controlled by the rudder pedále

Recommended pressure:

- main wheels         $1,6 \pm 0,1 \text{ atm (bar)}$
- nose wheel         $1,6 \pm 0,1 \text{ atm (bar)}$

### 7.5 Seats and Safety harness

The seats and back rests are formed by a composite skeleton covered with upholstery. Four points safety harness with a central lock

### 7.6 Baggage compartment

Baggage compartment is space behind seats.

### 7.7 Canopy

Canopy is made from the clear Plexiglas. The canopy frame is formed by a composite profile. The canopy is tilted forward.

### 7.8 Engine

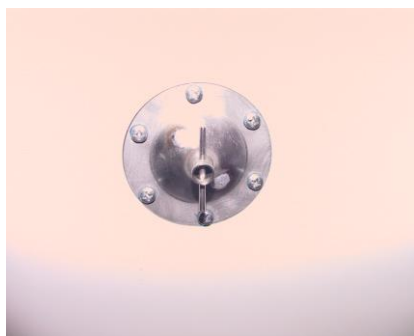
There is installed Rotax 912 engine in VL-3 aeroplane.

Rotax 912 is 4-stroke, 4 cylinder horizontally opposed, spark ignition engine .

### 7.9 Fuel system

The main fuel tanks are an integral part of the wings, a fuel quantity sensor is located inside the wing. Further a coarse filter, fuel valve, and fine filter are parts of the fuel system.

For draing use blow down valve located on the bottom of the wing.





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### 7.13 Miscellaneous equipment

Besides the standard instruments the VL-3 aeroplane is fitted with the following equipment:

### 7.14 Avionics

Flight instruments :

Engine instruments :