



# Project of an UAV of infinite autonomy

## TECHNICAL SHEETS

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# 1 Aerodynamic Characteristics

<b>WING PARAMETERS</b>	
<b>Span</b>	9,5 m
<b>Chord</b>	1,05 m
<b>Taper ratio</b>	1
<b>Dihedral</b>	0°
<b>Angle of attack</b>	6° (constant)
<b>Wing Profile</b>	SD7003 (constant)

Table 1: Aerodynamic parameters of the wing.

<b>HORIZONTAL TAIL PARAMETERS</b>	
<b>Span</b>	2,57 m
<b>Chord</b>	0,43 m
<b>Taper ratio</b>	1
<b>Dihedral</b>	0°
<b>Angle of attack</b>	3,5°
<b>Profile</b>	SD8020 (constant)

Table 2: Aerodynamic parameters of the horizontal tail.

<b>VERTICAL TAIL PARAMETERS</b>	
<b>Span</b>	1,15 m
<b>chord</b>	0,38 m
<b>Taper ratio</b>	1
<b>Profile</b>	SD8020 (constant)

Table 3: Aerodynamic parameters of the vertical tail.

## 2 Structural Characteristics

Element	Mass	x position	y position
Airframe	2,28 kg	1,16 m	0,12 m
Propulsion	0,89 kg	-0,05 m	0 m
Solar Cells	2,44 kg	0,53 m	≈ 0,05 m
Batteries	3,08 kg	0,06 m	0 m
Avionics	0,50 kg	0,06 m	0 m
Payload/ Bulk Weight	0,81 kg	0,06 m	0 m
<b>TOTAL</b>	<b>10 kg</b>	<b>0,42 m</b>	<b>≈ 0,04m</b>

Table 4: Breakdown of the c.g. calculation of the UAV

Element	Mass
Ribs	0,22 kg
Spars	1,09 kg
Skin	0,82 kg
Boom	0,15 kg
<b>TOTAL</b>	<b>2,28 kg</b>

Table 5: Airframe mass breakdown.

Element	Mass	x position	y position
Wing	1,84 kg	0,40 m	0 m
Horizontal Tail	0,20 kg	5,07 m	1,15 m
Vertical Tail	0,09 kg	5,04 m	0,58 m
Boom	0,15 kg	2,98 m	0 m
<b>TOTAL</b>	<b>2,28 kg</b>	<b>1,16 m</b>	<b>0,12 m</b>

Table 6: Breakdown of the c.g. calculation of the Airframe.

### 3 Propulsion Characteristics

<b>Number of Blades</b>	2
<b>Revolutions per minute</b>	1000 rpm
<b>Diameter</b>	100 cm
<b>Efficiency</b>	73%
<b>Torque</b>	0,77 N · m
<b>Airfoil</b>	ARA D 6% (Re = 50.000)

Table 7: Main dimensions and characteristics of the propeller design.

<b>Weight</b>	480 g
<b>Max. efficiency</b>	91 %
<b>Rated Power</b>	150 W
<b>Max. continuous torque</b>	177 mNm
<b>Operating temperature</b>	-30 to 100°C

Table 8: Specifications of the Maxon RE motor (serial number 148867).

<b>Weight</b>	28 g
<b>Max. efficiency</b>	90%
<b>Max. input speed</b>	8000 rpm
<b>Operating temperature</b>	-30 to 100°C
<b>Reduction ratio</b>	4,5:1
<b>Max. continuous torque</b>	550 mN · m
<b>Max. intermitent torque</b>	800mN · m

Table 9: Specifications of the Faulhaber gearbox of the Series 17/1.

## 4 General Characteristics

<b>GENERAL PARAMETERS</b>	
$C_L$ (cruise)	0,645
$C_D$ (cruise)	0,029
$C_{M_\alpha}$	-0,01375 1/°
$x_{cg}$	0,42 m
$l_{wt}$	4,75 m
Battery storage capacity	1528Wh
Propulsive efficiency ( $\eta_p$ )	59,8%
Max. Power	150W
Cruise velocity	13 m/s
Max. velocity (at Max.Power)	15 m/s
Stall velocity ( $C_l=1$ )	10,4 m/s

Table 10: General parameters.