



Technical Data Sheet

UAV Research Platform

IMPULLS

(Innovative Modular Payload UAS-LLS)

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1 General Description and Purposes of the UAS

The IMPULLS system is a fixed wing UAS research platform. The main application area is sensor-, avionics- and mission management systems- testing under airborne conditions. The near-model-aircraft-size design makes it possible to operate the A/V under Germany's current airworthiness regulations for autonomous unmanned aircraft systems without special permissions as the minimum takeoff weight is below 25 kg. This is the case when no payloads are installed. The maximum takeoff weight of 29.6 kg allows for payloads of up to 10 kg that are carried in a modular, easy accessible payload bay. The endurance of 75 min. with electric propulsion is unique in its class. However, expected advancements in battery technologies are expected to have a significant impact on overall flight time. For electromagnetic compatibility reasons the payload bay is spatial separated from the autopilot and the controls lane as well as from the electric propulsion train. This guarantees interference free measurements and a safe operation of the UAS equipped with a wide variety of payloads. During the mission the A/V is autonomously guided by an autopilot that comprises the flight control system and an integrated navigation system which provides inertial, magnetic and air data for the Flight Control Computer. Redundancy is given for most of the electric and electro-mechanical (actuators) systems in order to reach a high safety standard.

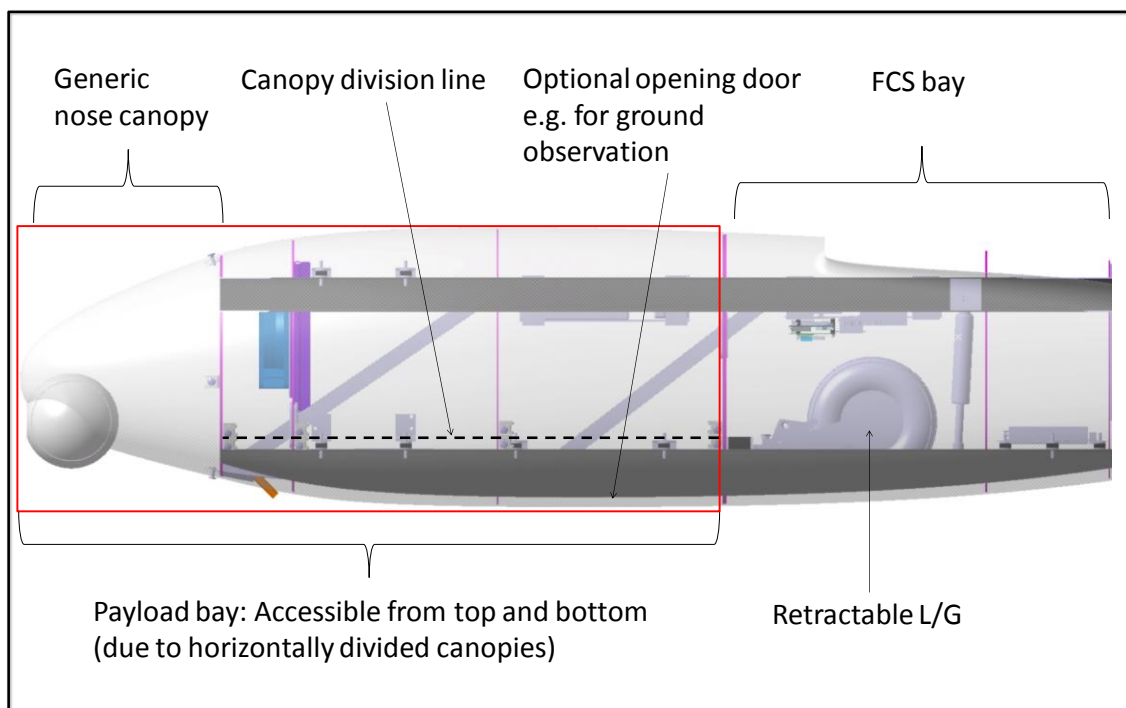
IMPULLS- Research Platform



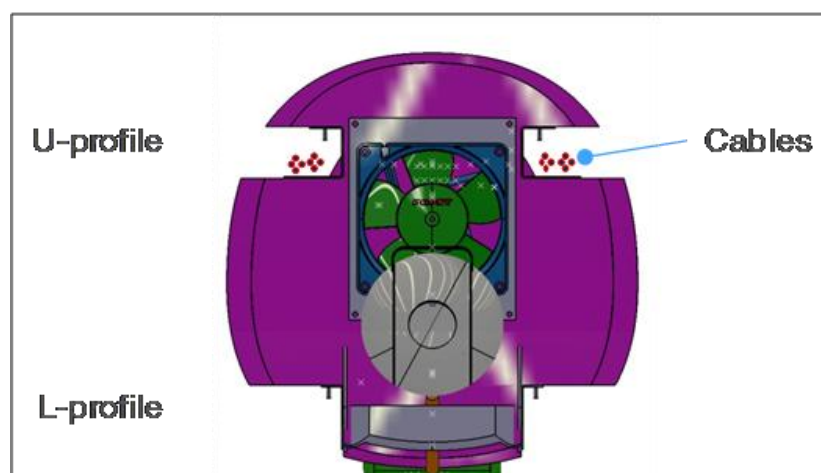
2 Payload Bay

The following figure shows the front part of the fuselage with the voluminous payload bay. An upper and a lower rail pair (colored in grey) provide a comfortable and generic fixing system as well as a clear cable guiding. The overall dimension of the payload bay is 634x150x270 mm (Length x Width x Height) subdivided with two frames in between. The nose canopy is separate from the upper and the lower main canopies and so can be adapted to certain applications (e.g. different camera types).

Payload Bay



Two-pair Rail System for Cabling and Attachment of Payloads (front view)



3 Aircraft Performance

	Value	Unit
Takeoff Distance*	~20	[m]
Climb Rate	3	[m/s]
Design Cruise Speed	19	[m/s]
Stall Speed	15	[m/s]
Service Ceiling	>1100	[m]
Endurance	75	minutes
Maximum g	5	[-]
Navigational Accuracy (horizontal)	2.5 (CEP 50%)**	[m]
Navigational Accuracy (vertical)	~10	[m]

*Depending on the winch performance

**Circular Error Probability: The radius of a horizontal circle, centered at the antenna's position, containing 50% of the fixes

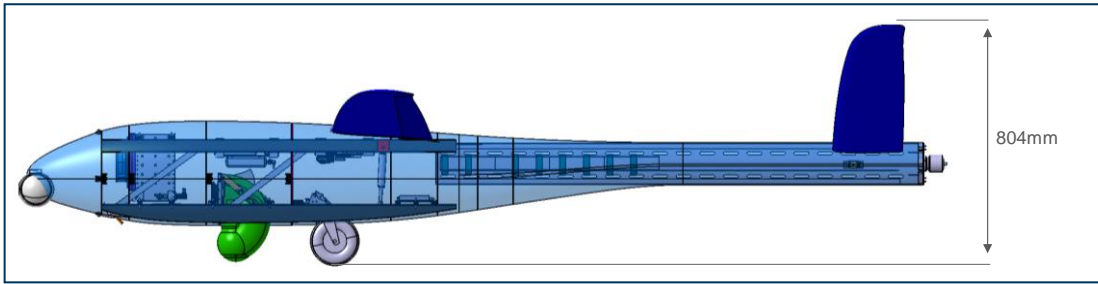
4 Dimensions and Weights

Weights	[kg]
Empty Weight	~20
Takeoff Weight (max.)	~30
Payload (max.)	10
Batteries*	5.7

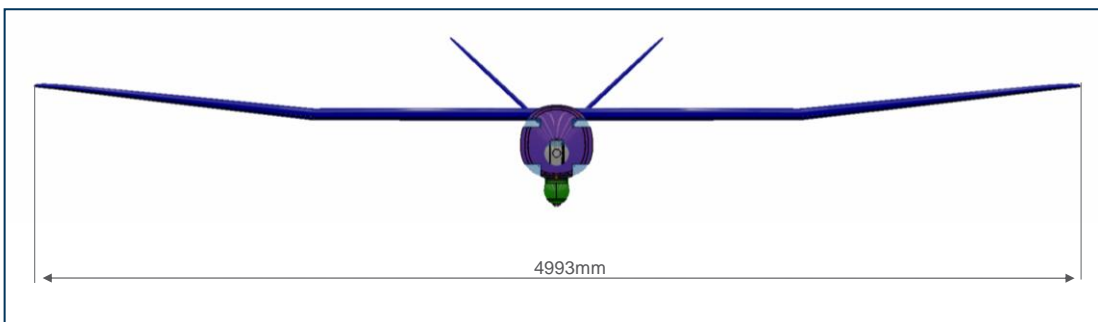
*For 75 minutes flight with max. Payload

Dimensions	Value	Unit
Overall Length	3.0	[m]
Overall Height	0.8	[m]
Wing Span	5.0	[m]
Wing Area	1.55	[m ²]
Aspect Ratio	16.1	[-]

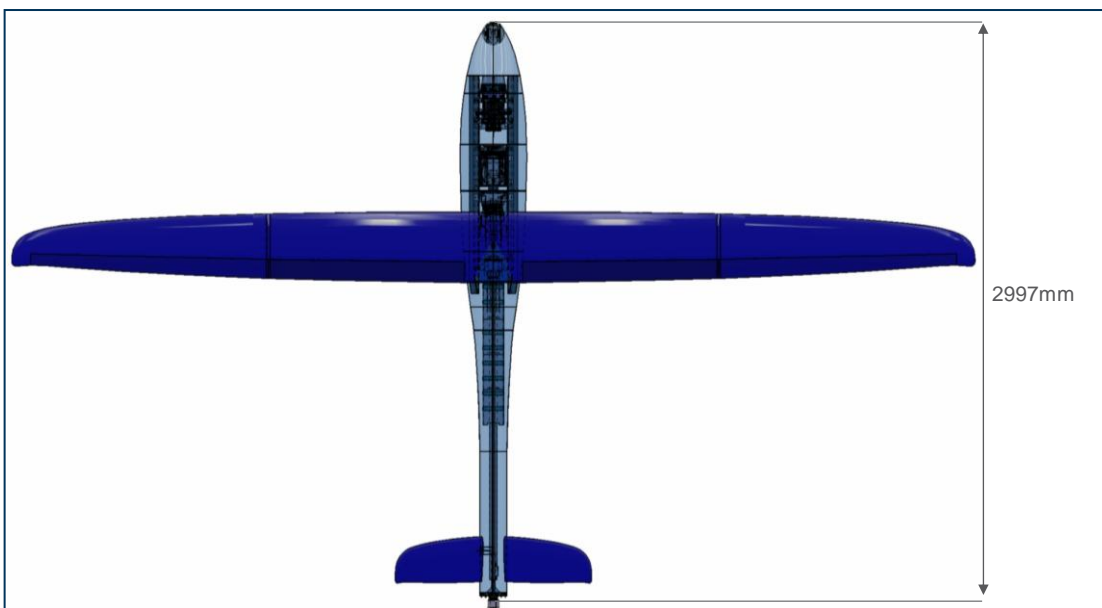
Side View



Front View



Top View



5 Available Features

Feature	
Modular and easy accessible payload bay	√
Comfortable cabling	√
EMC* proven design	√
Operation on unpaved ground	√
Electric propulsion	√
Extended flight-endurance (75 min. electric-driven) due to a highly efficient aerodynamic design	√
Dismountable into compact, transportable parts	√
Short turn-around-times due to a novel propulsion integration	√

*Electromagnetic Compatibility

6 Infrastructure

For operating and transportation purposes the following infrastructure respectively major accessory is needed:

- Transportation box of the size 1.5x1.5x3.0 m for the A/V
- Generator to supply the ground control station and the battery chargers.
- Electric or gasoline-driven winch for the takeoff run. A
- Van for the mentioned equipment
- Airfield of the size 150x20 m for safe takeoff and landing.

7 Abbreviations

A/V	Air Vehicle
EMC	Electromagnetic Compatibility
UAS	Unmanned Aerial System
IMPULLS	Innovative Modular Payload UAS-LLS