

# EXOLAUNCH

SPACE. LET US  
TAKE YOU THERE



**Authors**

Name	Contact	Initials
Carolyn Baumann	<a href="mailto:carolyn@exolaunch.com">carolyn@exolaunch.com</a>	CB
Michael Tolstoj	<a href="mailto:michael@exolaunch.com">michael@exolaunch.com</a>	MT

**Change Log**

Version	Author	Date	Changes
0.1	CB	03 MAY 2025	Pre-release version.
1.0	CB	24 MAR 2026	First release

**Applicable Documentation**

#	Changes
AD-1	CubeSat Design Specification Rev. 14

# Table of Contents

- 1.1 What is EXOpod AIR and specifically the 12U XL variant? ..... 5
- 1.2 Purpose and Applicability ..... 6
- 1.3 Quality Assurance ..... 6
- 1.4 Qualification and Flight Heritage ..... 6
- 2.1 Components and Features ..... 8
- 2.2 EXOpod AIR 12U XL Configuration ..... 9
- 2.3 CubeSat Allowable Volume ..... 10
  - 2.3.1 CubeSat-to-AIR Fitcheck ..... 11
- 2.4 Deployment Energy ..... 12
- 2.5 Tip-Off Rates ..... 12
- 3.1 Coordinate System ..... 14
- 3.2 Mass Properties ..... 14
- 3.3 Outer Dimensions ..... 15
- 3.4 Loads and Finite Element Modeling ..... 16
- 4.1 Launch Vehicle Interfaces ..... 18
  - 4.1.1 Rear Plate Mounting Interface ..... 20
  - 4.1.2 Lifting Interface ..... 20
  - 4.1.3 Grounding ..... 21
  - 4.1.4 Remove Before Flight Elements ..... 22
- 4.2 Satellite Interfaces and Accessibility ..... 23
  - 4.2.1 Rails and Clamping Mechanism ..... 23
  - 4.2.2 Deployment Wagon ..... 24
  - 4.2.3 Set Screws ..... 24
  - 4.2.4 Doors and Locking Mechanism ..... 25
- 5.1 Electrical Connectors ..... 27
- 5.2 Harness Routing ..... 29
- 5.3 Umbilical Connection ..... 30
- 6.1 Thermal Qualification ..... 32
- 6.2 Satellite Interfaces ..... 32
- 6.3 Launcher Interfaces ..... 32



## 1.1 What is EXOpod AIR and specifically the 12U XL variant?

Exolaunch has long been at the forefront of CubeSat deployment. Our EXOpod Classic and EXOpod NOVA CubeSat deployers have successfully delivered 500+ CubeSats of all sizes, from 0.25U to 16U, to orbit across 45+ missions on more than half a dozen launch vehicles. With the EXOpod NOVA we introduced a new market standard for larger, heavier and more performant CubeSats.

Following the success of EXOpod NOVA, we have created the next market leading system: EXOpod AIR.

EXOpod AIR, AIR for short, is designed to support a new class of missions with tighter mass budgets and more compact launch configurations, such as small and midsized launchers and OTVs. AIR is fully compatible with the Cubesat Design Specification (CDS) and retains the heritage, reliability, and user-friendly features of NOVA, which our customers love and trust, while taking the title of the most light weight deployer on the market. With a mass allowance of at least 2 kg per U (baselining SpaceX rideshare missions) and a standardized protrusion allowance of 11.0 mm across all CubeSat sizes, EXOpod AIR is tailored to meet the needs of all CubeSat missions, which prioritize payload-to-mass ratio and do not require the additional performance of NOVA. All our products are compatible with any launch vehicle or OTV.

AIR 12UXL expands the AIR product line to support missions that require extended internal volume. Developed in response to the needs of a large-scale CubeSat constellation which exceeds the CDS, the EXOpod Air 12U XL configuration demonstrates Exolaunch's ability to tailor our products to customer needs and provide bespoke solutions.

Built for flexibility, engineered for performance, EXOpod AIR continues the EXOpod legacy into new frontiers of smallsat launch capability.



Figure 1: EXOpod NOVA 12U S4 and EXOpod AIR 12U XL S4 side by side.

## 1.2 Purpose and Applicability

This User Manual defines the interface requirements between EXOpod AIR 12U XL and a customized CubeSat using Exolaunch launch services and products.

The document also specifies the minimum requirements for compatibility with EXOpod AIR12U XL and the Launch Vehicle flight safety program when using Exolaunch services. This includes a description of all mechanical, thermal, and electrical interfaces, as well as their performance specifications.

This document is valid until it is rescinded by Exolaunch or is superseded by a subsequent document version.

## 1.3 Quality Assurance

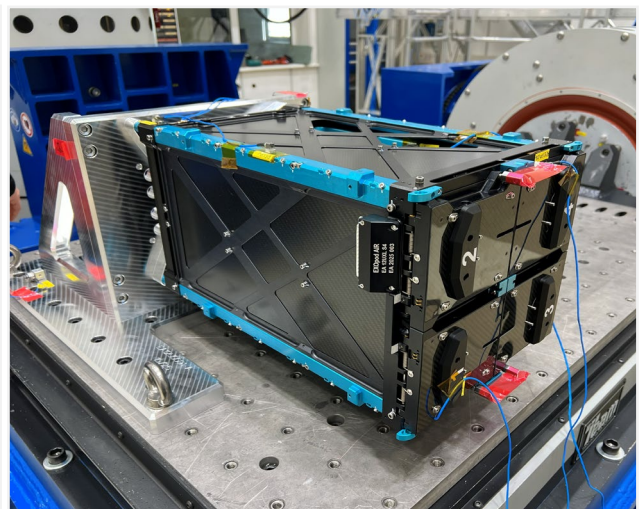
Quality assurance for the EXOpod AIR separation system is ensured at every step of the production chain. The entire production line fulfills the highest quality assurance requirements. The facilities that manufacture Exolaunch products are certified to ISO 9001:2015 standard, which requires regular inspection of the manufacturing and assembly facilities and ensures consistently high quality of the final product. These quality standards are also applied to the extensive qualification and acceptance testing processes.

## 1.4 Qualification and Flight Heritage

EXOpod AIR 12U XL qualification ensures that its products are compatible with all existing and new emerging launch vehicles on the market, as well as with evolving customer requirements. Our separation systems go through rigorous qualification programs following proven industry standards, incl. SMC-S-016 and ECSS and encompass environmental test requirements of the largest launch providers such as SpaceX, Rocketlab, Arianespace and Avio.

In addition, the deployer has inherited many of its features and mechanisms from the EXOpod deployer family which has established flight heritage since 2017. To date, the EXOpod family of deployers has launched across 30+ missions and has successfully deployed over 425+ CubeSats between 0.25U to 16U into orbit without failure. The EXOpod family has delivered payloads to LEO, GTO and GEO.

**Figure 2:**  
EXOpod Air 12U XL during environmental qualification testing.





**EXOpod Air Ultra Lightweight  
CubeSat Dispenser**

## 2.1 Components and Features

The main components of the EXOpod AIR 12U XL are shown in Figure 3. Each component is described in detail later in the document.

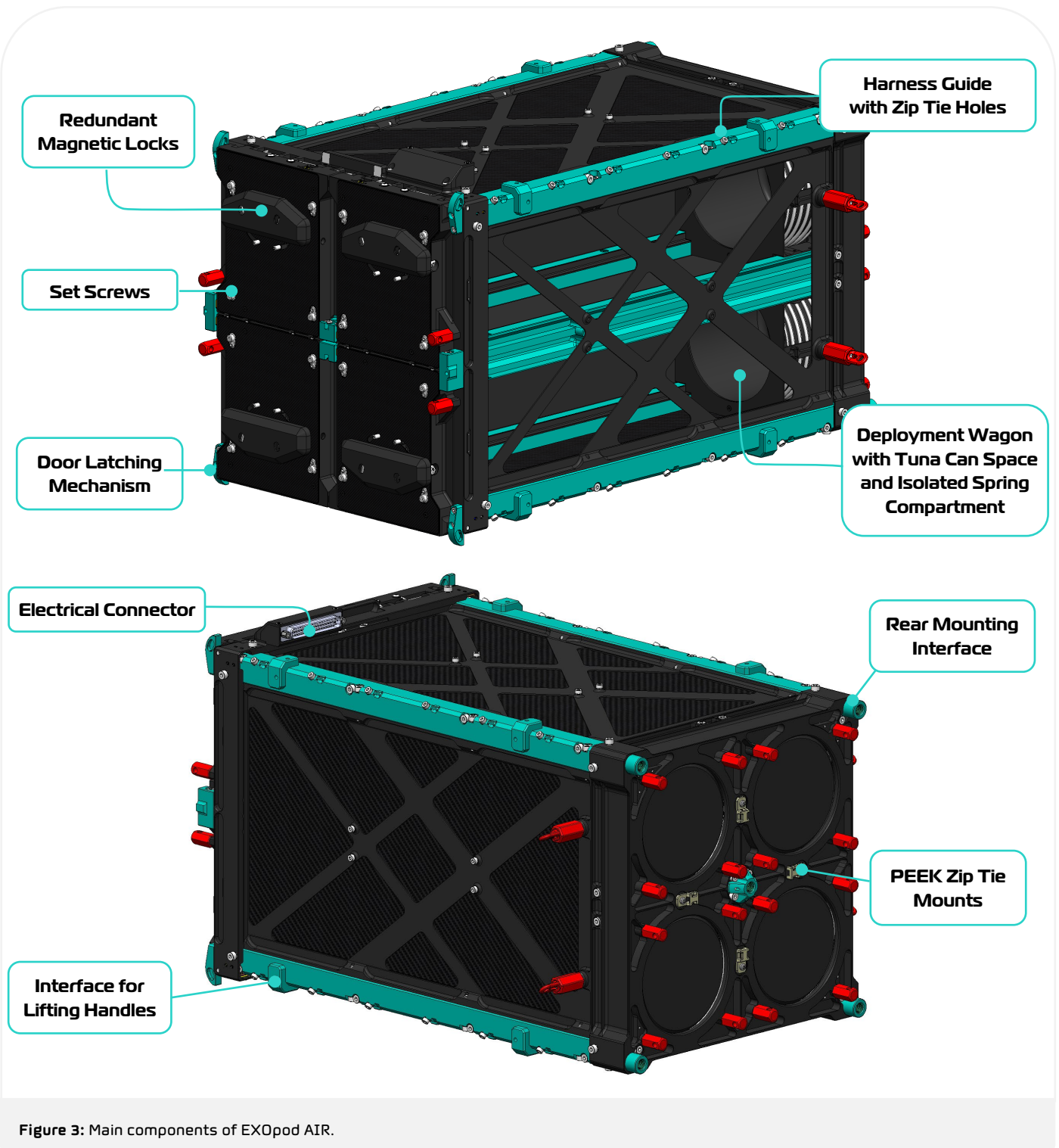


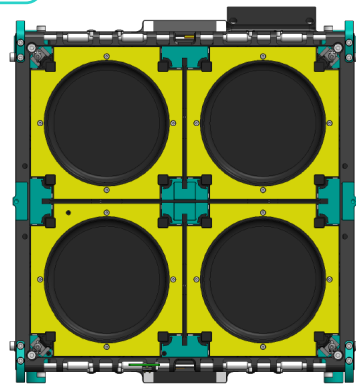
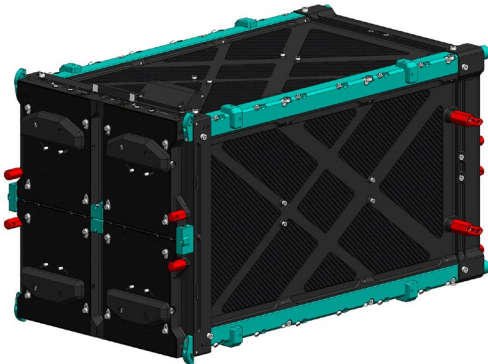
Figure 3: Main components of EXOpod AIR.

## 2.2 EXOpod AIR 12U XL Configuration

The EXOpod AIR 12UXL S4 consists of one rear plate mounting configuration. The corresponding "S-code", S4, specifies the number of slots available.

The deployer has no access windows to reduce the overall system mass further, offering the best payload/mass ratio on the market.

**12U XL S4 RPM – 4x3U XL Slots  
Without Window Access**



**Figure 4:** Representations (Left) and internal configuration (Right) of the 12U XL EXOpod AIR S4.

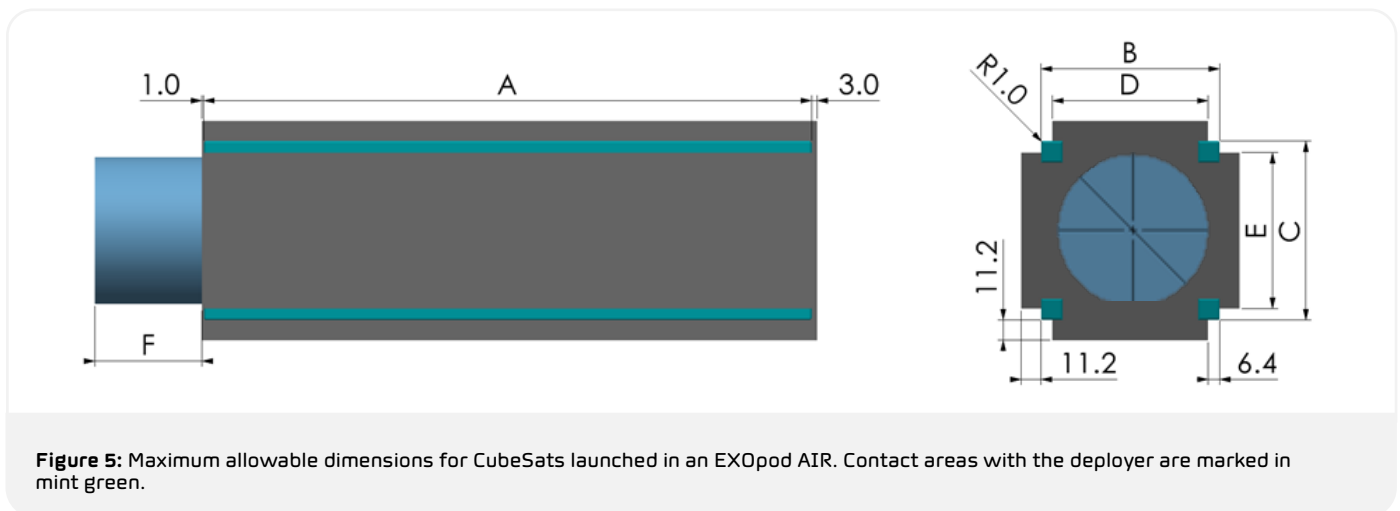
### 2.3 CubeSat Allowable Volume

The general requirements of CubeSats are provided in the CubeSat Design Specification (CDS) Standard Rev. 14. For the EXOpod Air 12U XL variant specifically, Exolaunch defined and customized the CubeSat rail length (Z-axis) as **370.9mm**. A full overview of the CubeSat dimension requirements is provided in Table 1.

Protruding features may be of any size within the usable volume envelope, but no part may extend beyond it. Custom CubeSat form factor may also be accommodated. Please contact Exolaunch.

The CDS states that Aluminum 7075, 6061, 5005, and/or 5052 may be used for both the main CubeSat structure and the rails.

**Caution:** The rails must additionally be **hard anodized (Type III)**. Any deviation from the CDS, such as, but not limited to, the use of a different material or surface finishes (e.g. other forms of anodizing or a chromate conversion dual finish) **must be approved by Exolaunch in written form. Additional compatibility testing may be required.** Furthermore, any holes or edges on the CubeSat rail must be adequately chamfered. The rails must have a surface roughness of  $Ra \leq 1.6$ . **These requirements also apply to satellite engineering models using EXOpod AIR or TestPods!**



**Figure 5:** Maximum allowable dimensions for CubeSats launched in an EXOpod AIR. Contact areas with the deployer are marked in mint green.

**Table 1:** Maximum CubeSat dimensions

Description	Tolerance	Units	Letter	3U XL
CubeSat Rail Length (Z)	±0.5 mm	mm	A	3U XL: 370.9
CubeSat Rail Width (X)	-0.1 mm +0.3mm		B	100.0
CubeSat Rail Height (Y)	-0.1 mm +0.3mm		C	
Max Space Between Rails (X)			D	87.2
Max Space Between Rails (Y)			E	
Max Tuna Can Length (Z)			F	78.0
Max Tuna Can diameter (X/Y)			G	94.0
Max Protrusion from Rail (X/Y)		-	11.0	
Number of Tuna Cans		-	-	1
Distance Between Tuna Cans		mm	-	-
Maximum Mass		kg	-	3U XL: 6.5

The maximum recommended distance between the COG and the geometrical center is outlined in Table 2. All values are based on the CDS [AD-1] and should be seen as a guideline rather than a firm limitation. For unique CubeSat designs, the deviations can be higher, however, this can lead to increased local loads on the satellite during testing and launch and can also cause higher tip-off rates. For questions on custom designs and form factors, contact Exolaunch.

**Table 2:** Maximum recommended distance of the COG from the geometrical center

Description	X-axis (mm)	Y-axis (mm)	Z-axis (mm)
3U XL	± 45	± 45	± 70

### 2.3.1 CubeSat-to-AIR Fitcheck

To guarantee the compatibility of the CubeSat and AIR 12U XL deployer, Exolaunch requires performing:

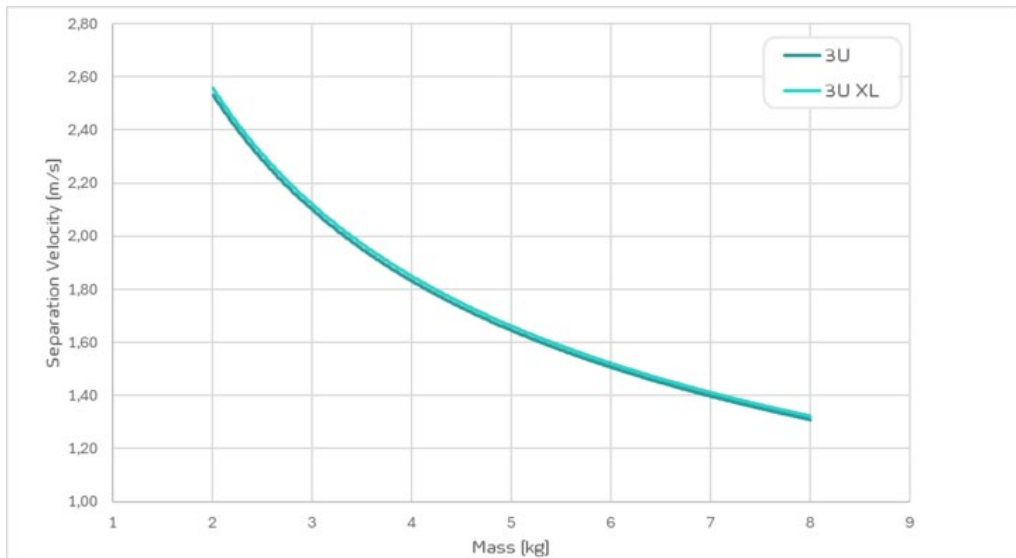
- › A virtual fitcheck using a simplified CAD model of EXOpod AIR and the satellite
- › The measurement of the rail dimensions on the assembled satellite
- › A physical fitcheck with an Exolaunch AIR or Exolaunch provided TestPod

Exolaunch will provide a rail measurement guide as well as a simplified 3D model of the applicable EXOpod AIR configuration on request.

## 2.4 Deployment Energy

Deployment velocities are calculated based on the physical properties of the mechanical springs. Each AIR has 4 springs, this means that in the 3U XL slot the deployment wagon (often called pusher plate) is pushed by one out of four springs. Typical CubeSat velocities are illustrated in Figure 6. Satellite specific deployment velocities are coordinated in the mission specific ICD. For more information reach out to Exolaunch.

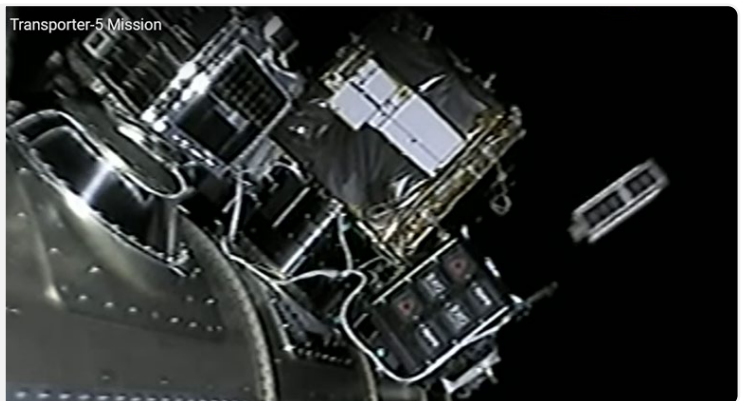
**Figure 6:**  
Deployment velocities for different CubeSat sizes and masses



## 2.5 Tip-Off Rates

Tip-off rates for all CubeSat types are expected to be below 10 deg/s in all axes and are dependent on CubeSat mass properties. 3U long form factor types tend to be more stable. The separation half cone angle is  $\pm 7.5$  deg.

**Figure 7:**  
Successfully deployed CubeSat on SpaceX Transporter-5 mission



# ESB

**Mechanical Properties**

### 3.1 Coordinate System

The coordinate system of EXOpod AIR is shown below. The coordinate system's origin is in the center of the rear plate mounting interface plane.

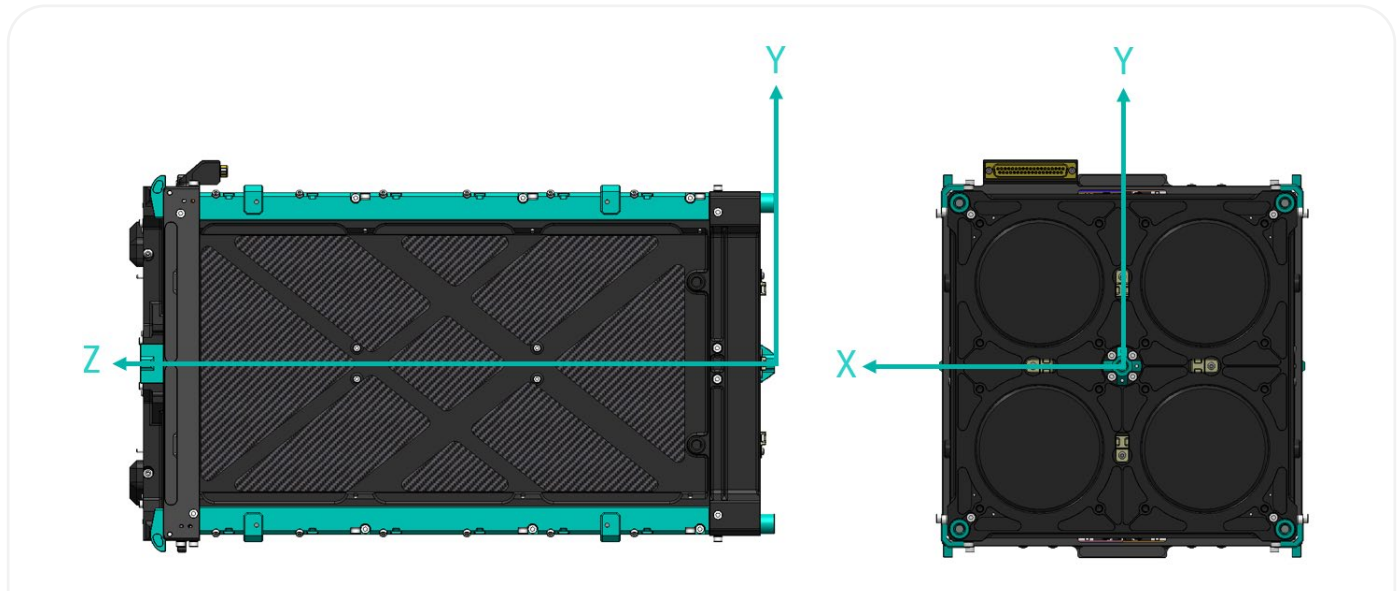


Figure 8: Coordinate System of the EXOpod AIR.

### 3.2 Mass Properties

Detailed open and stowed mass properties for the EXOpod AIR 12UXL configuration can be found within Appendix A Table 10 through Table 11.

- › AIR configuration: 12UXL S4
- › Open and Closed state: see Table 3
- › The masses do not include slot adapters or fasteners.

Table 3: Nova in stowed and deployed configuration.

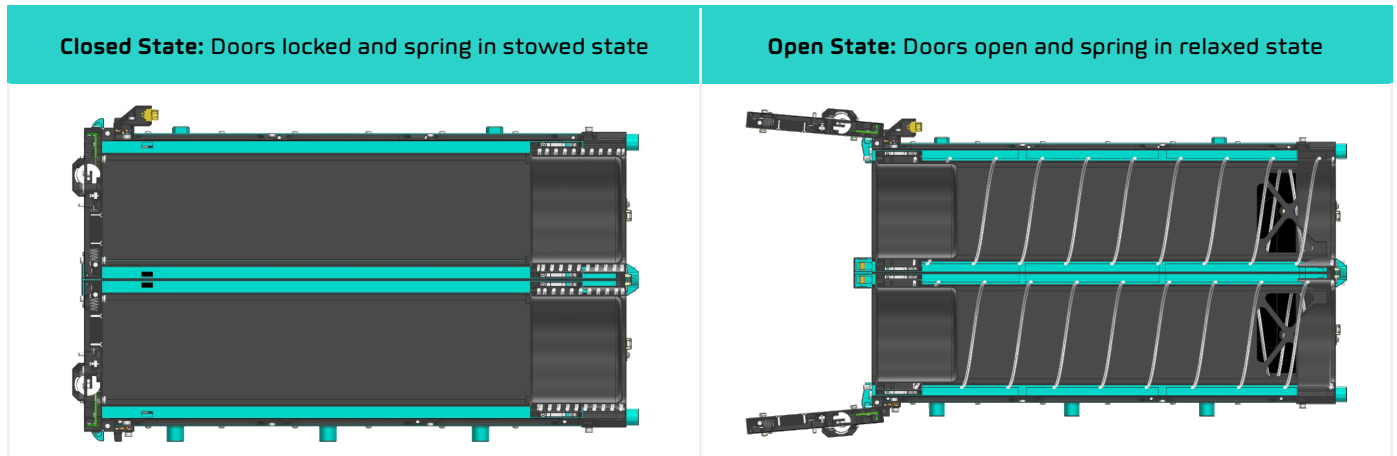


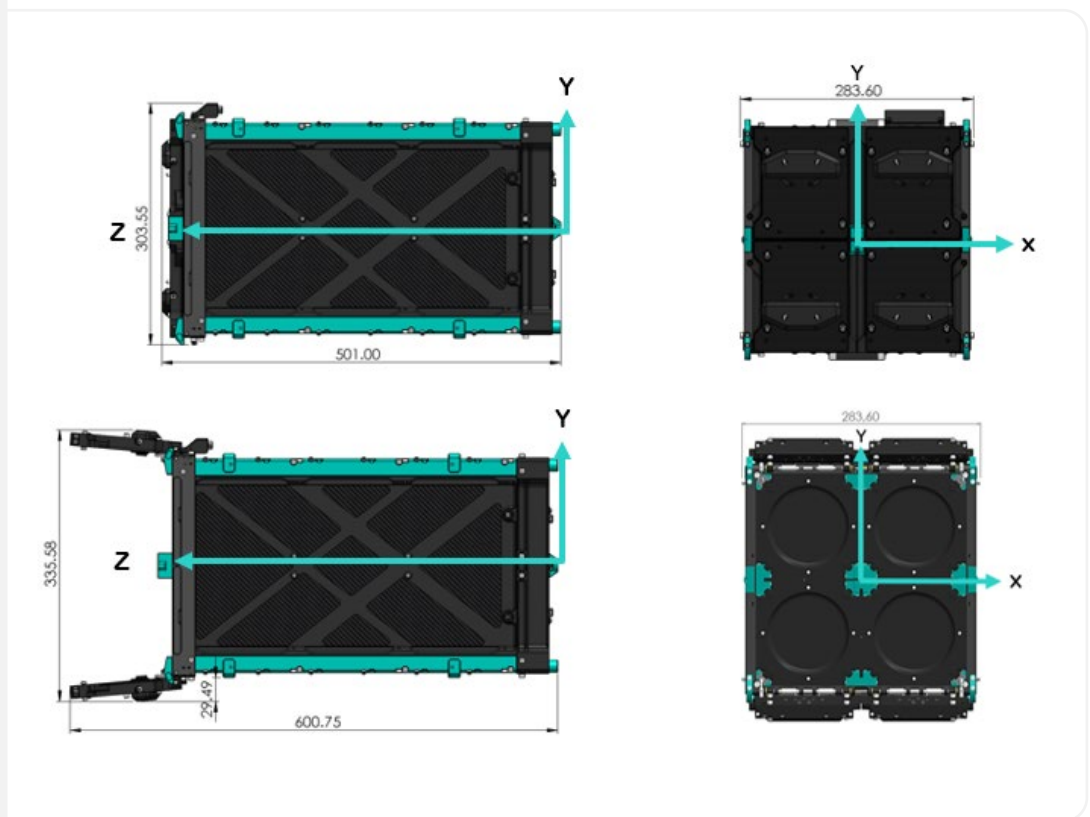
Table 4: EXOpod AIR masses of different configurations.

AIR Configuration	Access Window?	Mass [kg]	Tolerance
12U XL S4 RPM	No windows	8.63	+/-5%

### 3.3 Outer Dimensions

The outer dimensions of the 12UXL EXOpod AIR variants are shown in Figure 9 respectively.

Figure 9:  
12U XL EXOpod AIR  
outer dimensions.



## 3.4 Loads and Finite Element Modeling

Modelling the dynamic behavior of a CubeSat-Deployer coupled system is challenging and is not recommended for most missions. The challenge of the task stems from the fact that manufacturing tolerances – which can't be modelled in FEM - have significant impact on the fit and the dynamic behavior of the coupled system. The damping effect of the clamping mechanism adds to the complexity of the behavior. Even small differences in the size of the CubeSat rails (~0.1mm, within the standard rail size tolerances) have an effect on the force applied by the rail clamps. Since the travel on the clamps is small, even tiny changes have a large effect; this explains the wide range of forces provided in section 4.2.14.2.1. This effect has been verified in test.

Exolaunch can provide transfer functions which are derived from vibration testing with simple mass simulators, on request. These offer a good reference point for the customer to understand the load levels their satellite will experience, acknowledging the above-mentioned uncertainty.

Modelling effort can be justified if a particular risk with a sensitive payload or subsystem has been identified. In such cases an FEA can be used to understand how launch environments may affect the satellite, however there is inherent uncertainty which can't be overcome outside of testing. The best approach is to create the model using assumptions about how the satellite is fixed in the deployer, then add margins on top to account for the uncertainty. The best way to get an accurate understanding of the loads is to perform a joint test in the CubeSat deployer, which Exolaunch can offer as a special service in justified cases.

Detailed FE models of the EXOpod AIR 12U XL for customer use are not available. However, Exolaunch can provide transfer functions for the AIR 12U XL configurations.



# **Mechanical Interfaces**

## 4.1 Launch Vehicle Interfaces

EXOpod AIR 12U XL has only mechanical interfaces on rear faces for Rear Plate Mounting (RPM), which allows for two distinct mounting orientations on the launch vehicle adapter. The interface properties are summarized in Table 5 and are shown in Figure 10. For alternative secondary retention methods, please consult with Exolaunch.

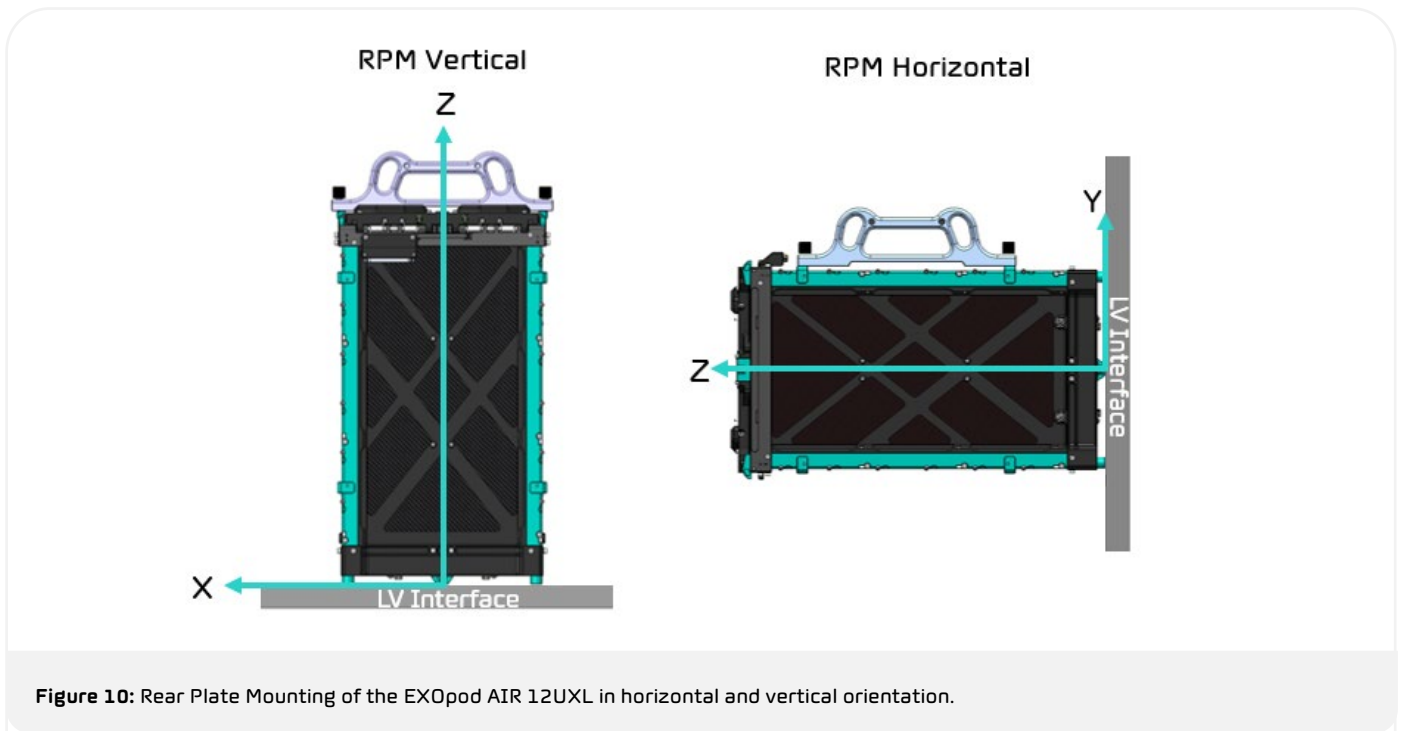
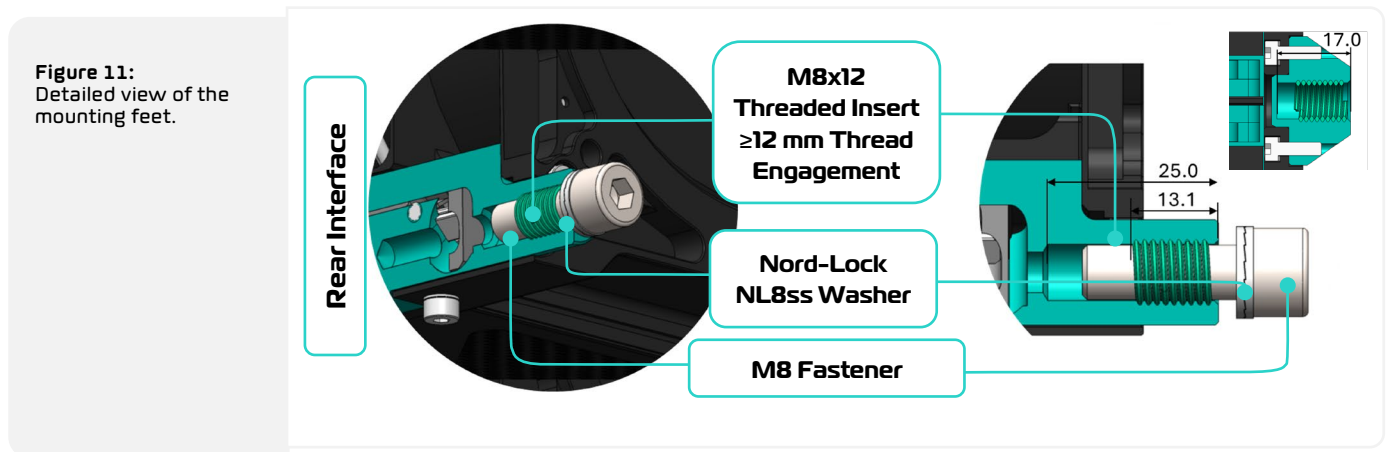


Figure 10: Rear Plate Mounting of the EXOpod AIR 12U XL in horizontal and vertical orientation.

**Table 5:** Mechanical interface specification.

	Rear Plate Mounting, RPM
Deployment	Normal to mounting plane
Attachment points	5
Thread	M8x12 Helicoil free-running insert
Required fastener type	M8, BUMAX 88 (800 MPa Ultimate Strength) or stronger
Required lock washer	Nord-Lock NL8ss
Min. screw-in depth	13 mm (for 1.5D = 12mm thread engagement)
Max. screw-in depth	Corner feet (4x) - 23 mm Center foot (1x) - 15 mm
Tightening torque	22.0 Nm (11kN pre-load)
Surface finish	Ra 1.6
Overall Flatness	< 0.1 mm

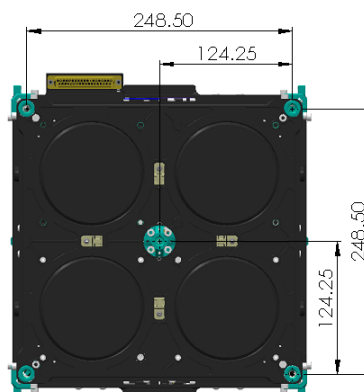
The mounting feet of EXOpod AIR feature a free running threaded Helicoil insert for M8 fasteners. The mounting feet on the rear face are directly connected to the internal structure providing increased stiffness.



### 4.1.1 Rear Plate Mounting Interface

The mounting hole pattern of the rear plate mounting (RPM) interface is shown in Figure 12.

**Figure 12:**  
Mounting hole pattern of the RPM interface on the 12UXL AIR.

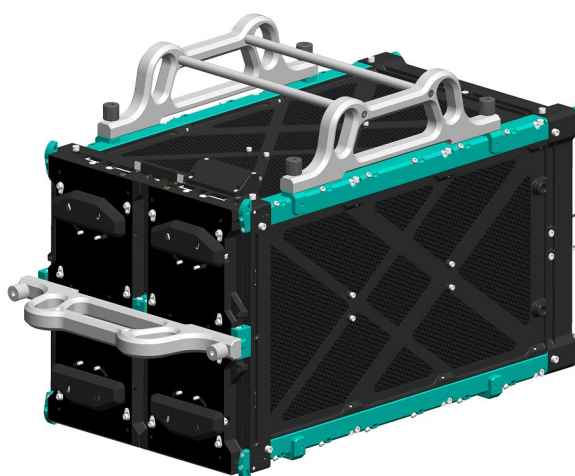


### 4.1.2 Lifting Interface

EXOpod AIR provides a dedicated mounting interface for lifting handles on four of the six faces (top, side and front), providing maximum flexibility for handling and for different mounting orientations. The lifting handles allow a loaded EXOpod to be lifted by crane or by hand safely and conveniently. Each handle is attached to NOVA using two M4 thumb screws.

There is a significant safety margin built into the design of the handles, with each handle having a Safe Working Load of 200kg. The use of a crane is strongly advised when moving a loaded deployer. Lifting at an angle is to be avoided. Figure 13 shows EXOpod AIR with lifting handles mounting locations.

**Figure 13:**  
EXOpod AIR with lifting handles installed on the top face and on the +Z face.



### 4.1.3 Grounding

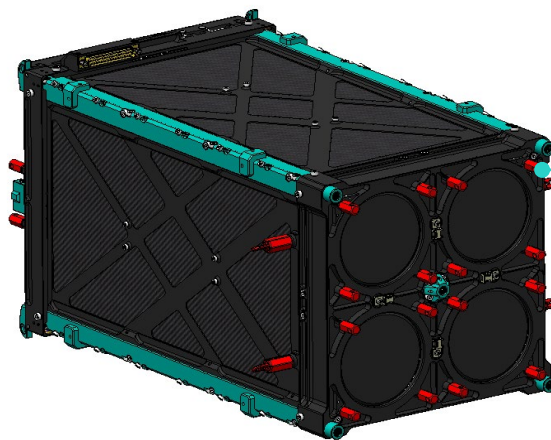
CubeSats are electrically isolated from the deployer when loaded inside. Grounding through the EXOpod AIR is established through a conductive path along the mounting interface screws.

### 4.1.4 Remove Before Flight Elements

Three sets of Remove Before Flight (RBF) pins provide safety during ground handling, satellite integration, and launch vehicle mating procedures, as illustrated in Figure 14:

- › **Doors:** Each door is secured by a threaded RBF pin. This is the last RBF element to be removed before launch.
- › **Deployment Spring:** The deployment spring is retained by an innovative spring-loaded RBF pin, which is also used on the CarboNIX microsatellite separation system. The pin is inserted when the deployment wagon is in a deployed state, with the spring-loaded element of the RBF pin snapping into place once the deployment wagon is pushed fully backwards into its stowed position.
- › **Deployment wagon:** A third set of pins, identical to the ones used on the doors, are used during CubeSat integration to further secure the deployment wagon in a fully stowed position. This ensures the set screws can be adjusted correctly.

**Figure 14:**  
EXOpod AIR  
with RBF pins  
installed  
(indicated in red).



## 4.2 Satellite Interfaces and Accessibility

### 4.2.1 Rails and Clamping Mechanism

The CubeSat rails are the primary interface between the satellite and EXOpod AIR. Exolaunch has developed a unique clamping system which is highly effective at constraining the satellite in the X and Y directions, thereby preventing it from shaking and rattling during transportation and launch. This clamping force is achieved by moving clamping surfaces on up to three guide rails inwards towards the CubeSat. The mechanism engages as the door of the slot is closed, and the force increases linearly with a decreasing opening angle of the door.

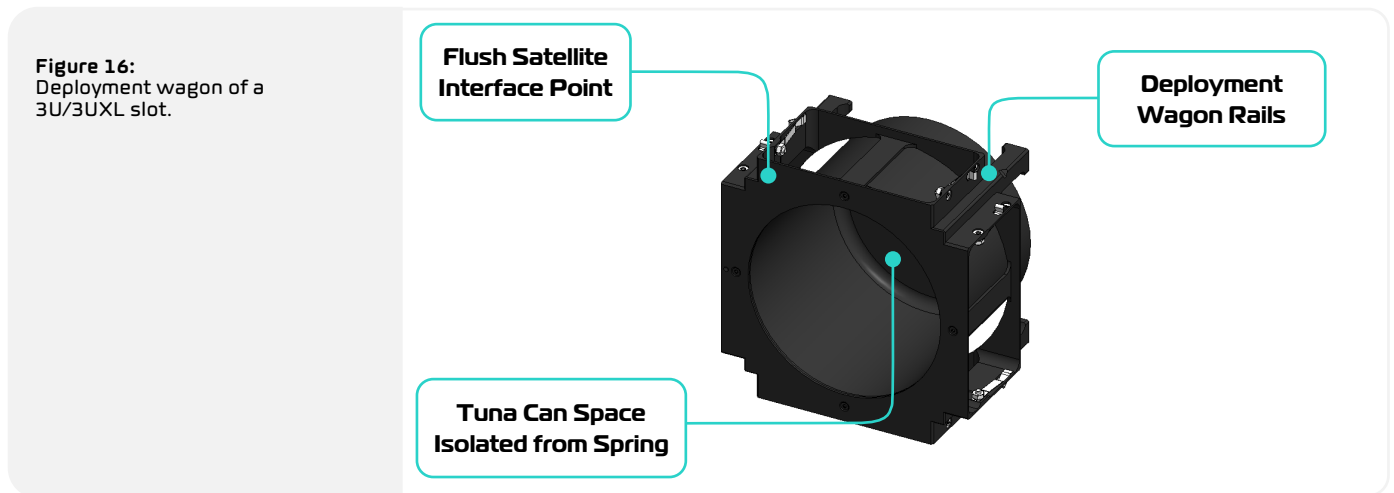
The total clamping force of the mechanism varies depending on the size of the slot as well as on the size of the CubeSat within the allowable tolerances. 3U slots have a clamping mechanism on a single rail. The principle is illustrated in Figure 15. As an example, a 3U CubeSat on the lower end of the allowable size or 99.9 mm x 99.9 mm will experience a total clamping force of 1107 N, while the force will increase to up to 3332 N as the rail dimensions approach 100.3 mm x 100.3 mm in size.



Figure 15: Clamping principle in 3U / 3U XL CubeSat slot.

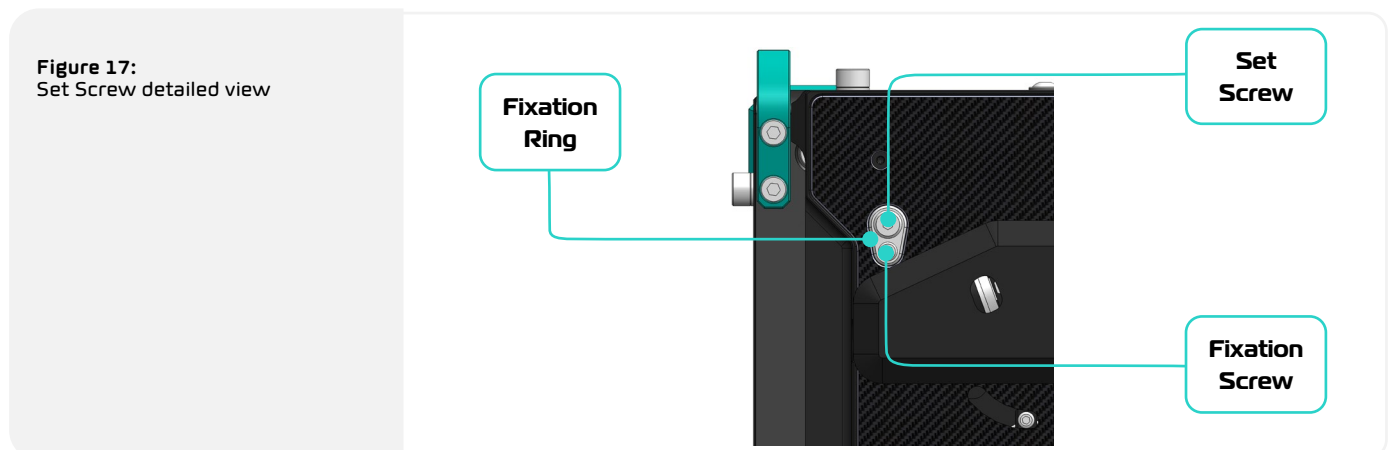
### 4.2.2 Deployment Wagon

The deployment wagon, shown in Figure 16, is situated between the spring and the CubeSat when the satellite is installed in the slot. It serves to keep the spring in the correct orientation and ensures that the spring force is correctly transmitted to the CubeSat. The deployment wagon is secured in the slot by an independent restraint mechanism. This mechanism will not release the wagon until the door has opened past 90 degrees, which prevents the possibility of the CubeSat impacting the door during deployment. The deployment wagon is stowed and secured with an RBF pin during integration.



### 4.2.3 Set Screws

CubeSats are secured inside the slot by means of a clamping mechanism, which applies a clamping force in the X and Y directions. CubeSats are further constrained in the Z-direction by the combination of the Deployment Wagon and the adjustable set screws located on the doors (see Figure 17). Once a satellite is placed inside EXOpod AIR, the door is closed, and the set screws are then tightened. This eliminates any gap created by loose tolerances, thus prohibiting any movement in the deployment direction. Each set screw is prevented from loosening by means of a fixation ring. When the fixation ring is engaged it acts like a wedge, preventing the set screw from coming loose.



### 4.2.4 Doors and Locking Mechanism

The doors of EXOpod AIR use a unique electromagnetic actuator which is used across all Exolaunch separation systems. Each door has two locks for redundancy, with each of them capable of triggering deployment independently. The locks require a 28VDC, 1.27A signal at room temperature. Detailed characteristics are shown in section 5.1. The high voltage and duration of the required pulse acts as a safety barrier which cannot be overcome by coupled signals due to RF-emission or static discharge. It also ensures universal compatibility with any launch vehicle by means of the low current compared to motorized systems.

The lock design allows the mechanism to be released and reset within seconds. This fast and simple process also allows functional checks to be easily performed after transportation to the launch site as well as after the final integration with the launch vehicle.

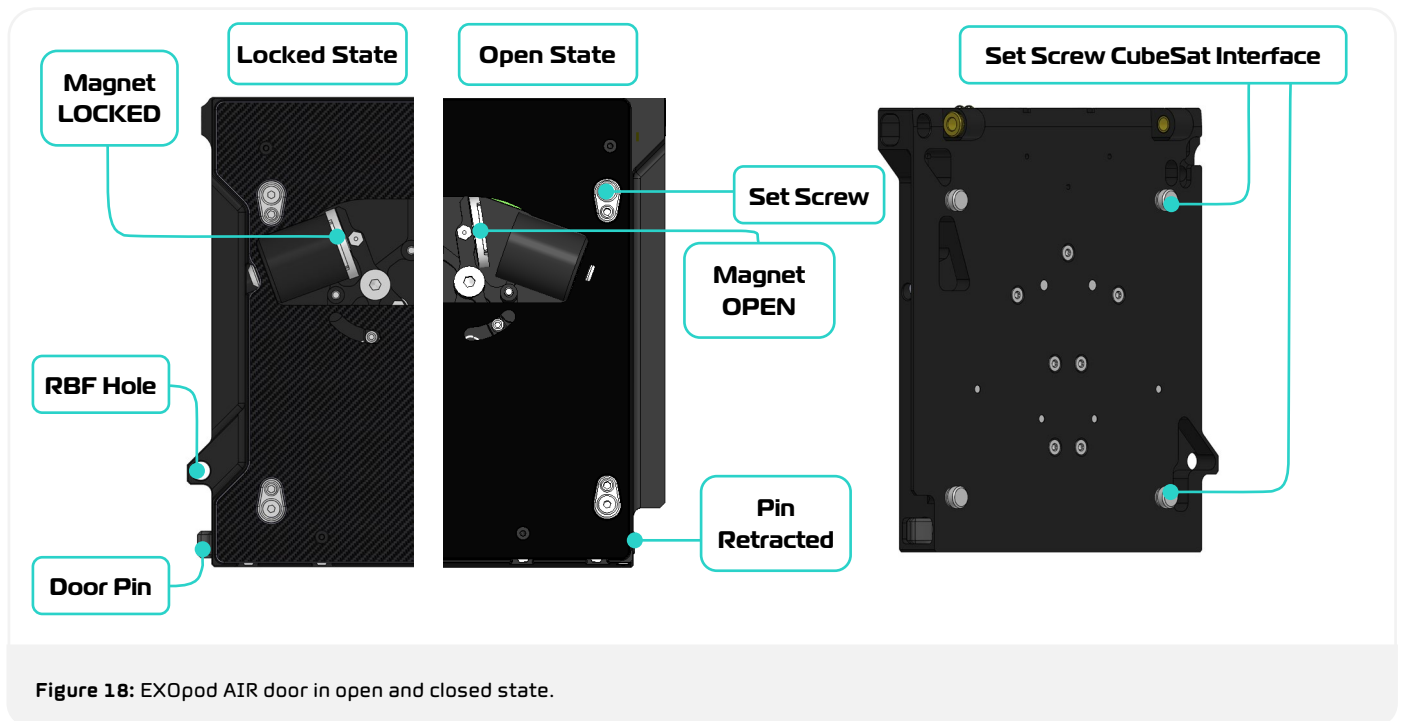


Figure 18: EXOpod AIR door in open and closed state.

The door system is designed with a mechanism that inhibits the release of the deployment spring and wagon until the door has reached an opening angle greater than 90 deg. This system prevents the satellite from impacting the door during deployment. A latching mechanism is built into the hinge of the door, locking the door open and preventing it from rebounding once the door has fully opened.



# **Electrical Interfaces**

## 5.1 Electrical Connectors

Each slot of EXOpod AIR has two magnetic locks acting as fully redundant actuators, as well as two reed switches for telemetry, indicating the state of the door and spring. For electrical connectivity, EXOpod AIR is equipped with a D-Sub 37-pin male connector (ITT Cannon DCMA37P), which is identical across all EXOpod AIR variants and serves as the primary electrical interface (see Figure 19). The connector pinout is shown in Table 6, and the corresponding slot numbers are indicated in Error! Reference source not found.. Exolaunch recommends a D-Sub 37-pin female connector from CONEC (part number 164X11799X) to be used for the electrical harness. For more detailed information contact Exolaunch.

EXOpod AIR features reverse polarity protection diodes on the actuator lines. The telemetry switches are Normally Open (NO), meaning that the first switch circuit closes when the deployer door has fully opened, and the second reed switch closes when the deployment wagon reaches the front of the deployer slot. The electrical signal characteristics for the actuators as well as guidelines for continuity checks are summarized in Table 7.

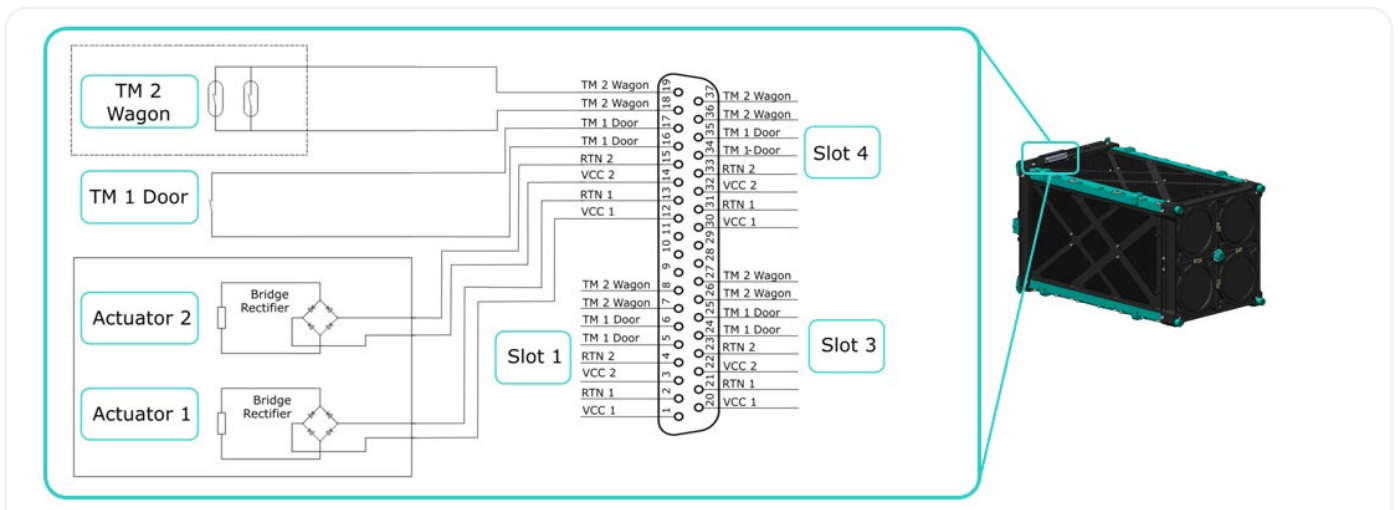


Figure 19: Left: D-Sub 37-pin main connector on EXOpod AIR top side (+Y) with pinout and actuator diagram.

**Table 6:** DSub 37 connector pinout. Green cells indicate that the pins for this slot are used in the respective NOVA configuration.

Pin	Slot	Function	EXOpod AIR Configuration				Remarks	
			S1	S2	S3	S4		
1	Slot 1	Actuator 1 VCC	Y	Y	Y	Y		
2		Actuator 1 GND						
3		Actuator 2 VCC						
4		Actuator 2 GND						
5		Door Status TM						
6		Door Status TM						Closed when door is fully opened.
7		Wagon Status TM						
8		Wagon Status TM						Closed when spring is fully extended.
9		x					not connected	
10		x					not connected	
11		x					not connected	
12	Slot 2	Actuator 1 VCC	N	Y	Y	Y		
13		Actuator 1 GND						
14		Actuator 2 VCC						
15		Actuator 2 GND						
16		Door Status TM						Closed when door is fully opened.
17		Door Status TM						
18	Wagon Status TM	Closed when spring is fully extended.						
19	Wagon Status TM							
20	Slot 3	Actuator 1 VCC	N	N	Y	Y		
21		Actuator 1 GND						
22		Actuator 2 VCC						
23		Actuator 2 GND						
24		Door Status TM						Closed when door is fully opened.
25		Door Status TM						
26		Wagon Status TM						Closed when spring is fully extended.
27	Wagon Status TM							
28		x					not connected	
29		x					not connected	
30	Slot 4	Actuator 1 VCC	N	N	N	Y		
31		Actuator 1 GND						
32		Actuator 2 VCC						
33		Actuator 2 GND						
34		Door Status TM						Closed when door is fully opened.
35		Door Status TM						
36		Wagon Status TM						Closed when spring is fully extended.
37		Wagon Status TM						

**Table 7:** Characteristics of the electrical signal to actuate the permanent magnets.

Parameter	Value	Permanent Magnet
Actuating voltage	Nominal: 28±4 VDC	
	Max: 50 VDC	
Pulse duration	Min: 0.130 s	
	Nominal: 0.5 sec	
	Max: 2 sec every 30 sec	
Current	No-fire: 600 mA	
	Nominal: 1270 mA	
	Max: 1600 mA	
Voltage Drop	1.2V± 10%	
Continuity checks	Actuator lines: 1.2±10% V voltage drop Telemetry lines: Open Loop >1MΩ (in armed mode)	Measured in multimeter diode mode Measured in multimeter resistance mode

## 5.2 Harness Routing

To facilitate harness routing along the chassis, harness routing points are located on the top and rear faces of EXOpod AIR (see Figure 20). The cable guides on the rear face are made from PEEK, a robust engineering plastic with low outgassing properties.



Figure 20: Left: Harness routing canal and fixation points. Right: Example of harness route.

### 5.3 Umbilical Connection

An umbilical connection for satellite charging or remote access after integration with the launch vehicle is not available as a standard option. Access to the satellite after integration into the EXOpod AIR is only possible through the access windows which requires direct access by personnel. Custom solutions for umbilical access can be evaluated on a case-by-case basis, talk to ExolauSnch.



**Thermal Interfaces**

## 6.1 Thermal Qualification

To guarantee flawless performance in space, the EXOpod AIR has been qualified to the environments listed in Table 8.

Table 8: Nova thermal qualification environment.

System level	Parameter	Conditions	
Magnetic lock	Thermal Cycling	27 cycles alternating between -34°C and +79°C	
EXOpod AIR	Operational	T <sub>MAX</sub>	+79°C
		T <sub>MIN</sub>	-34°C
EXOpod AIR	Survival	T <sub>MAX</sub>	+TBC°C
		T <sub>MIN</sub>	-TBC°C

## 6.2 Satellite Interfaces

Heat transfer between CubeSat and EXOpod AIR primarily takes place by means of heat conduction through the guide rails, deployment wagon, and set screws.

## 6.3 Launcher Interfaces

EXOpod AIR is not actively thermally controlled. A conductive thermal path is achieved through the mounting interface. The passive thermal properties are summarized in Table 9. A thermal model of the EXOpod AIR for customer use is not available.

Table 9: Thermal interface.

Description	Rear Plate Mounting Interface
Contact Area	12U XL: 478.4 mm <sup>2</sup>
Radiating Area	Rough estimate (Aluminum/Carbon): 12U XL: 0.5m <sup>2</sup> /0.25m <sup>2</sup>
Surface Material	Al 7021 Black Anodized (Type III): Emissivity (ε) ≈ 0.93, Absorption (α) ≈ 0.70



# **Integration and AIR Ecosystem**

Exolaunch has designed various support equipment to improve user experience, facilitate integration and testing of CubeSats into Nova and ship a loaded EXOpod AIR safely.

## 7.1 CubeSat Integration

The integration procedure for EXOpod AIR is described in detail in the AIR CubeSat integration Guide. Please contact Exolaunch for further details.

## 7.2 Transportation

To ensure safe storage and transportation, EXOpod AIR is stored and transported inside a Pelican Case with a laser-cut foam shell. For the shipment to the launch site, AIR is placed in an ESD bag with desiccant. Shock sensors are attached to the case, and the case is then strapped onto a pallet. For transportation without a satellite inside, the springs must be in their stowed state and secured using the provided RBF elements. For storage, the spring must be in its deployed state whenever possible. Before satellite integration, AIR is cleaned inside a cleanroom to standard ISO class 8 cleanliness requirements.



**Figure 21:** Custom Pelican case and secured for shipment (Shock sensors not shown)



# Appendix

**EXOpod AIR 12U XL Mass Properties**

The following tables give an overview of the mass properties of the 12U XL EXOpod AIR system. All tables use the EXOpod AIR coordinate system from section 3.1.

**Table 10:** Mass Properties 12U XL without Windows S4 PRM

Description	Closed		Open		Unit
Mass ( $\pm 5\%$ )	8.63				kg
Center of Gravity	X	0.43	X	0.43	mm
	Y	0.79	Y	0.79	
	Z	249.78	Z	308.61	
Moments of Inertia rel. to COG	I <sub>xx</sub>	356024.47	I <sub>xx</sub>	370165.95	kgmm <sup>2</sup>
	I <sub>yy</sub>	352963.2	I <sub>yy</sub>	342329.59	
	I <sub>zz</sub>	145910.14	I <sub>zz</sub>	170742.88	
Product of Inertia rel. to COG	I <sub>xy</sub>	1439.13	I <sub>xy</sub>	1042.43	kgmm <sup>2</sup>
	I <sub>xz</sub>	717.36	I <sub>xz</sub>	499.53	
	I <sub>yz</sub>	545.72	I <sub>yz</sub>	513.00	



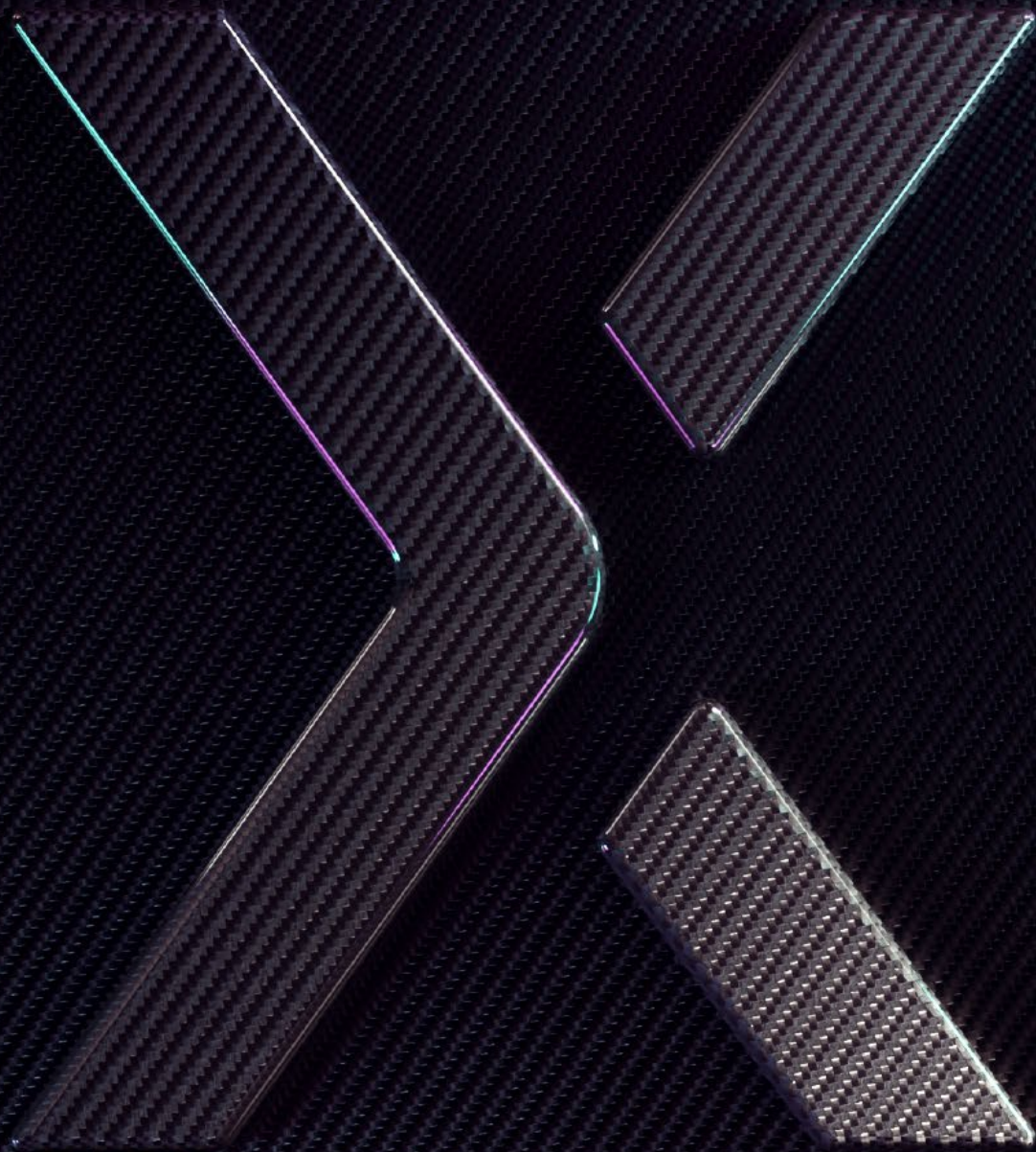
# Appendix

## **Acronyms**

Acronym	Description
BPM	Bottom Plate Mounting
CAD	Computer Aided Design
CDS	CubeSat Design Specification Standard Rev. 14
COG	Center of Gravity
FEA	Finite Element Analysis
FEM	Finite Element Modeling
LV	Launch Vehicle
MOI	Moment of Inertia
MGSE	Mechanical Ground Support Equipment
RBF	Remove Before Flight
RPM	Rear Plate Mounting
VDC	Volt Direct Current

# EXOLAUNCH

SPACE. LET US  
TAKE YOU THERE



© 2026 Exolaunch GmbH. All rights reserved. Exolaunch GmbH is the owner of the copyright in this work, and no portion hereof is to be copied, reproduced, or disseminated without the prior written consent of Exolaunch GmbH.

---

[EXOLAUNCH.COM](https://EXOLAUNCH.COM)