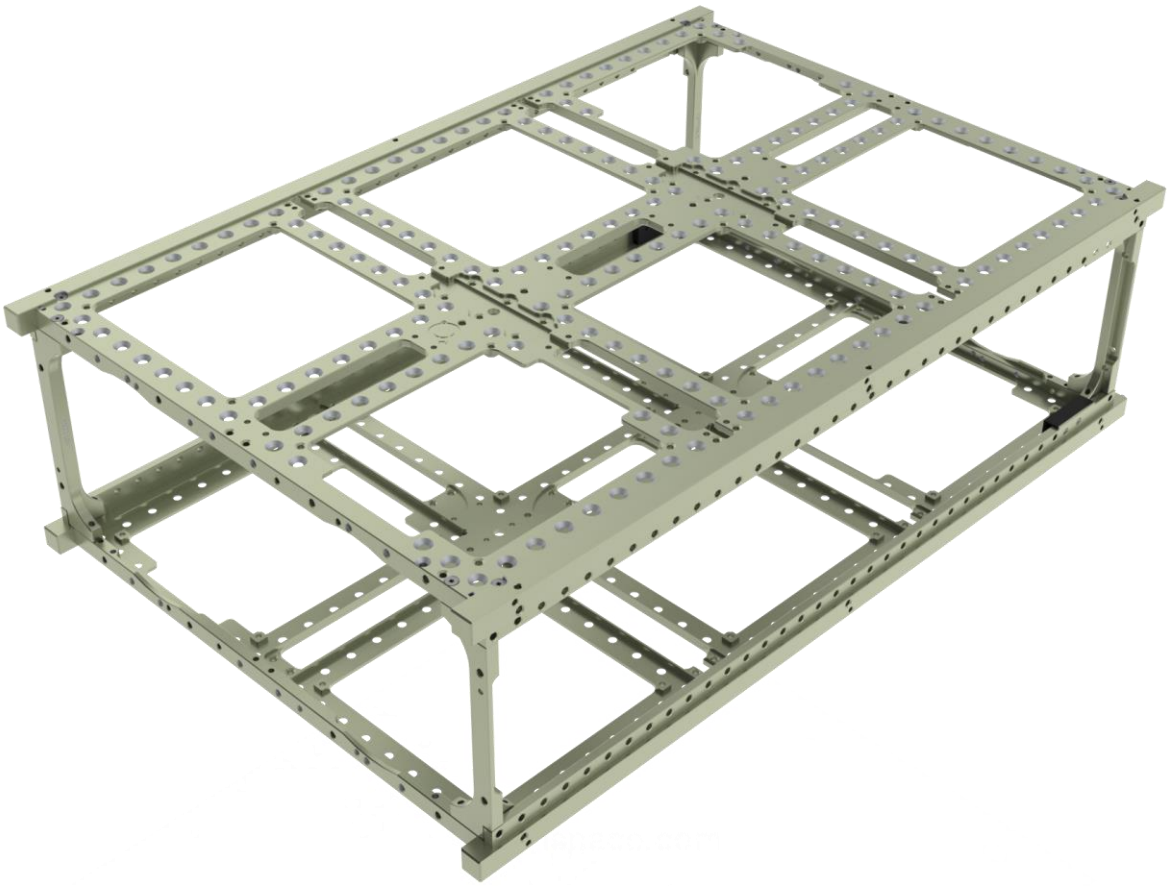

NanoStructure
6U

Datasheet
6U structure for Nano-satellites

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Product name: NanoStructure 6U

Document No.: 1060779

Revision: 1.2

Author: FJVO

Reviewer: FCO

Approval date: 08-08-2025

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2 Changelog

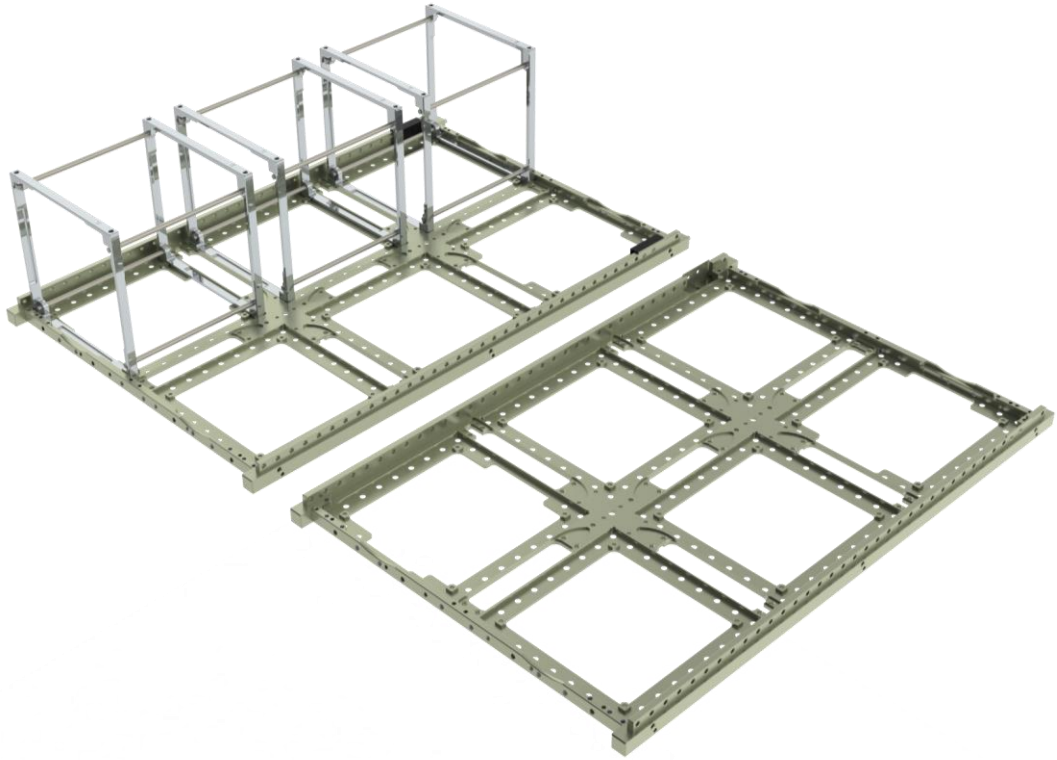
Revision	Date	Name	Description
1.0	04-10-2024	FJVO	Initial release
1.1	15-10-2024	FJVO	Updated Mass properties
1.2	08-08-2025	FJVO	Minor cosmetic update

3 Table of Contents

4 Overview

The GomSpace NanoStructure 6U is a generic structure to be used as framework for a 6U Nano-satellite. Using Mounting Rings, hardware can be mounted inside the structure, either in a standard PC104 stack or directly on the structure frame. Before mounting surface hardware (e.g. solar panels) all internal hardware are accessible. On the top of the structure there is four kill switches that can be used while the satellite is sitting in its deployer.

4.1 Highlighted Features



- High degree of freedom for hardware mounting with Mounting Rings
- Four kill switches with flight heritage from previous 6U satellite missions
- Threaded holes with screwlock helicoils
- Dedicated interface for Mechanical Ground Support Equipment, MGSE
- Flat internal walls allowing flexible and accurate positioning of a payload
- Interface for guide pins to increase positioning accuracy
- Material: Alu 7075-T7351
- Total mass of default structure: 665 g
- Outside measurements without kill switches: 340.5 x 226.3 x 100.0 mm

4.2 Compatibility

- Compatible with GomSpace products

4.3 Product Contains

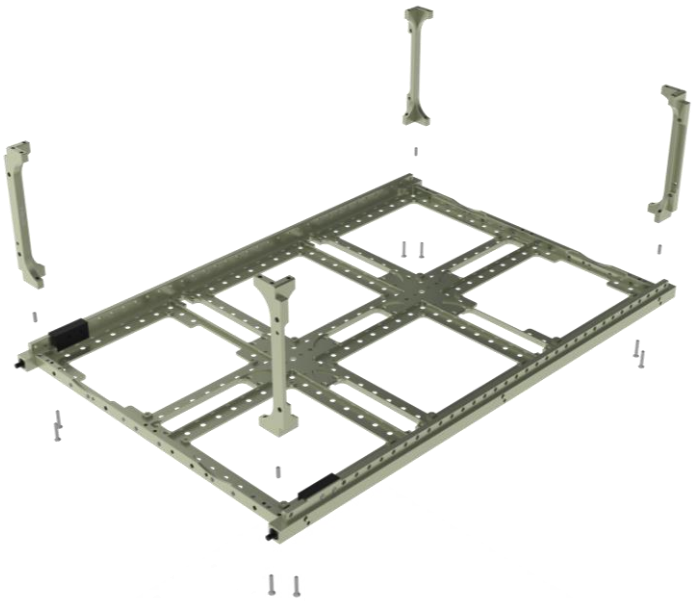
- 2x Side Walls with Kill Switch Assembly mounted to it.
- 4x Corner Brackets
- Screw & Pin kit
- Assembly Manual

5 Main Structure

The main Structure is made from 2 Side walls and 4 corner brackets. All threaded mounting holes have screwlock Helicoils. They are used for grounding and for thread locking without using a liquid locking adhesive solution such as Loctite®.

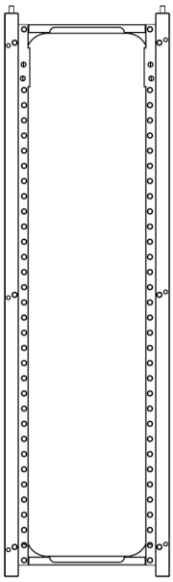
5.1 Corner Brackets

The Corner Brackets are allocated in each corner and is each assembled with two screws. Guided pins are used in the assembly to ensure accurate and repetitive assembly of the structure.

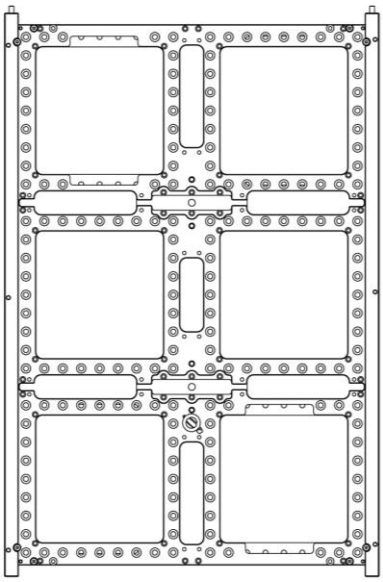


5.2 Wall Integration

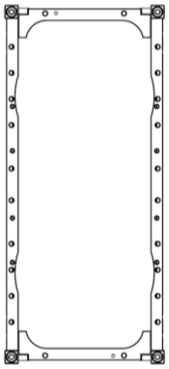
A Hole pattern is specifically made to fit GomSpace various range of product, and to give as high flexibility to integrate hardware as possible. Below is a view shown of the hole patterns that are available from XYZ planes, please consider the Mechanical Drawing, paragraph 8 to see the Panel mounting in more detail.



X-Panel Mounting



Y-Panel Mounting

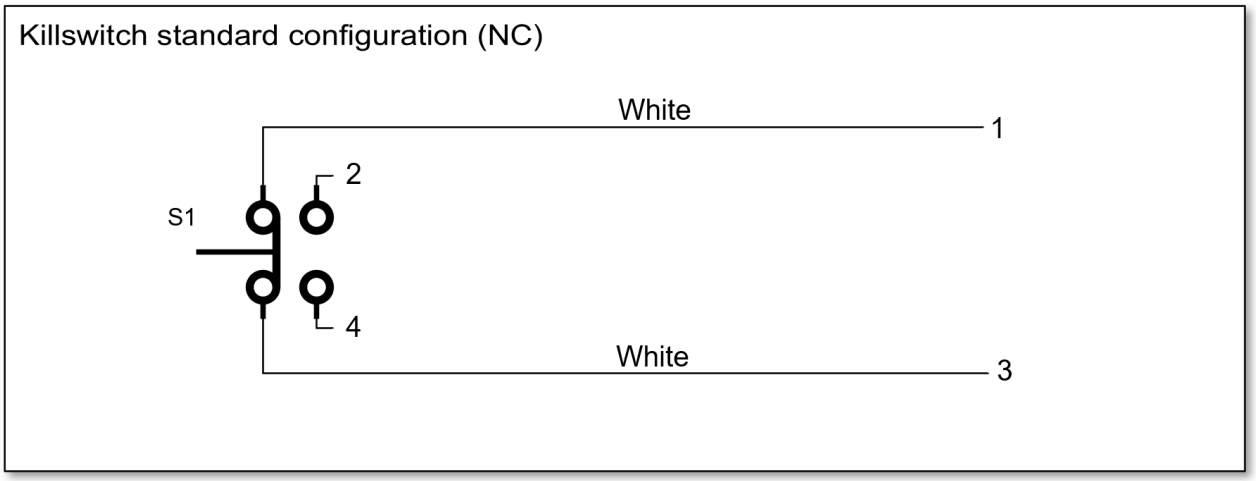


Z-Panel Mounting

5.3 Kill Switch and Separation Springs

At the top of the structure frame are four Kill Switches, which are pressed down while the satellite is placed in its orbital deployer. The switches are intended to be connected to the power system of the satellite, to prevent powering up the satellite during launch. As soon as the satellite is released, it can power up and work normally.

The kill switches can be configured either as normally closed (NC), or Normally Open (NO), as an example of a NC configuration, please consider the illustration underneath. Upon ordering the NanoStructure 6U, through its Option Sheet it is possible to select the length and type of cables to attach to each Kill Switch, which is soldered to the switch pins and then glued inside the housing.



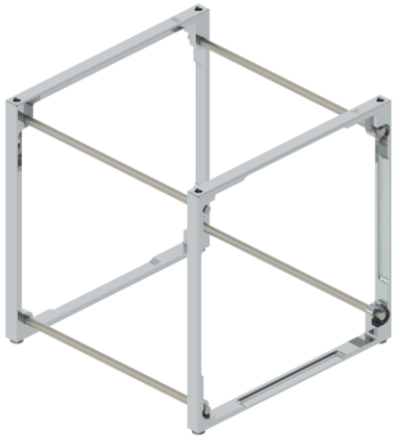
It is also possible to decide to add wires only to some of the Kill Switches, rather than to all four. Regardless of whether any Kill Switch is connected, the spring plunger is always installed to provide uniform separation force from all four structure feet. The configuration is defined through the option sheet of the structure.

Please Note: the force from each kill switch is 6 N when the switch is pressed down and is flush with the structure feet.

5.4 Mounting Rings

The mountings Rings are used for a highly modular internal layout, allowing for numerous variations of the PC104 stack. Each stack is mounted inside the structure frame and can point in any of the three main axis's.

There are two pairs of mounting Rings available A + B and YA + YB. Each pair can be connected with threaded rods and secured with a slotted nut on the two sides. The slotted nut is placed in the indents of the Rings, which is on the opposite side on Ring A and B and of Ring YA and YB (for this reason the Rings are usually used in pairs. A and B are used in the top and bottom of a PC104 stack when mounting on the frame.

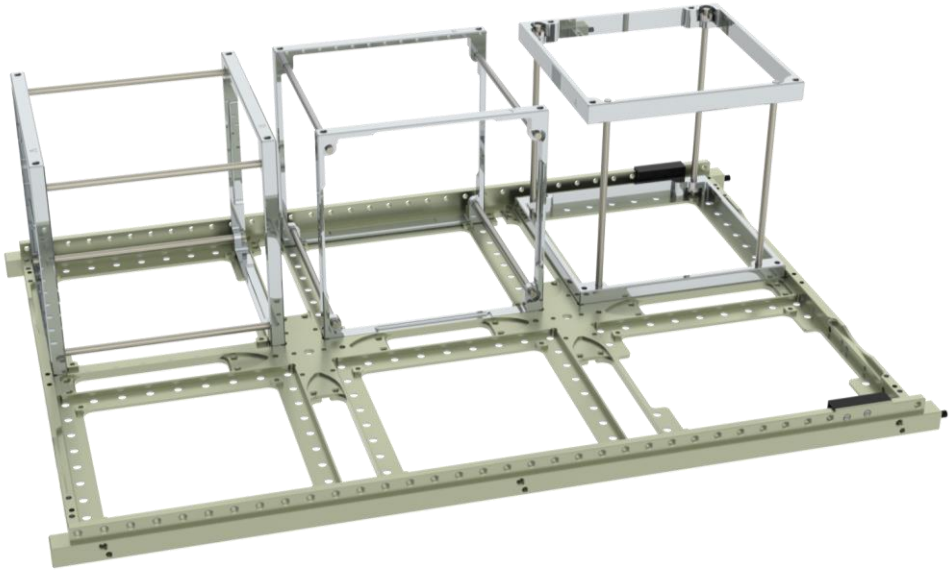


A + B Ring

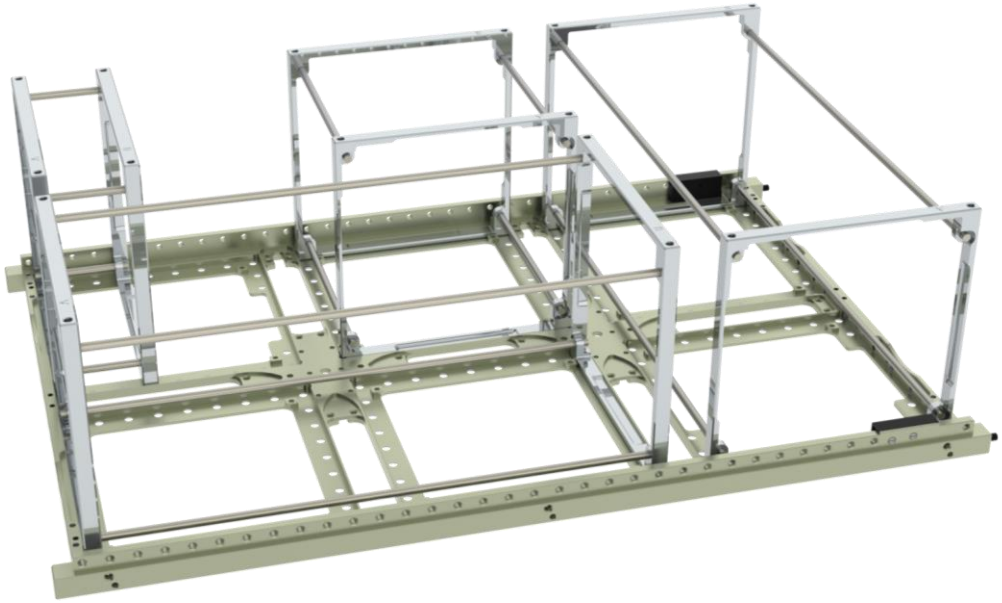
YA + YB Ring

YA and YB are used in the top and bottom of a of PC104 stack when mounting the PC104 stack to point out the 6U side.

Below is a drawing illustrating where three stacks pointing in each of the three main axis's. Left and middle are A and B Rings, and right are used the YA and YB Rings.



The stacks built with Ring A and B pairs can be mounted shorter and taller than a 1U height. Below is an illustration showcasing various ways the stacks can be used. Additional intermediate mounting Rings can be inserted in a stack in case additional support is required. Ring sets are ordered through the Option Sheet.



6 Physical Properties

6.1 Size

With deployment switches stowed.

Description	Value	Unit
Size	340.5 x 226.3 x 100.0	mm

6.2 Mass

Total mass for default delivered structure, 2x frames and 4x corners, including screw and pin kit.

Description	Value	Unit
Total mass	~665	g

Mass for individual components:

Description	Value	Unit
Side Frame, including kill switches	306	g
Corner bracket	10	g
A or B mounting Ring	14	g
YA or YB mounting Ring	24	g
M3 threaded rod	0.0495	g/mm
Flying Leads, 60 cm	6	g

6.3 Surface Treatment

Both Panels and Corner brackets are surface treated with SurTec 650 chromitAL TCP MIL-DTL-5541F Type II Class 3, to provide a moderate corrosion resistance while maintaining electrical conductance for leveling electrical potential throughout the structure.

6.4 Material

For all parts of the primary structure, EN AW7075-T7351 is used. The material properties for this material, as specified through its datasheet, can be found bellow.

Typical physical properties:

Density [g/cm3]		2,80
Elastic modulus [GPa]		72
Thermal conductivity [W/m*K]		130 - 160
Thermal expansion coefficient [K-1*10-6]	**-50°C - 20°C**	21,6
	20°C - 100°C	23,4
	20°C - 200°C	24,3
	20°C - 300°C	25,2
Specific heat J/(kg * K)		862
Electrical conductivity [m/Ω*mm2]		19 - 23
Shear modulus [GPa]		27,1

Delivery Condition	Tensile strength Rm MPa		Elastic limit R p0.2 MPa		Elongation %	
AW7075-T7351	min.	max.	min.	max.	A50mm	A
	475	-	390	-	-	5

7 Qualification

To simulate the harsh conditions of launch and space, the 6U NanoStructure has been exposed to several environment tests. Levels can be seen in the table below.

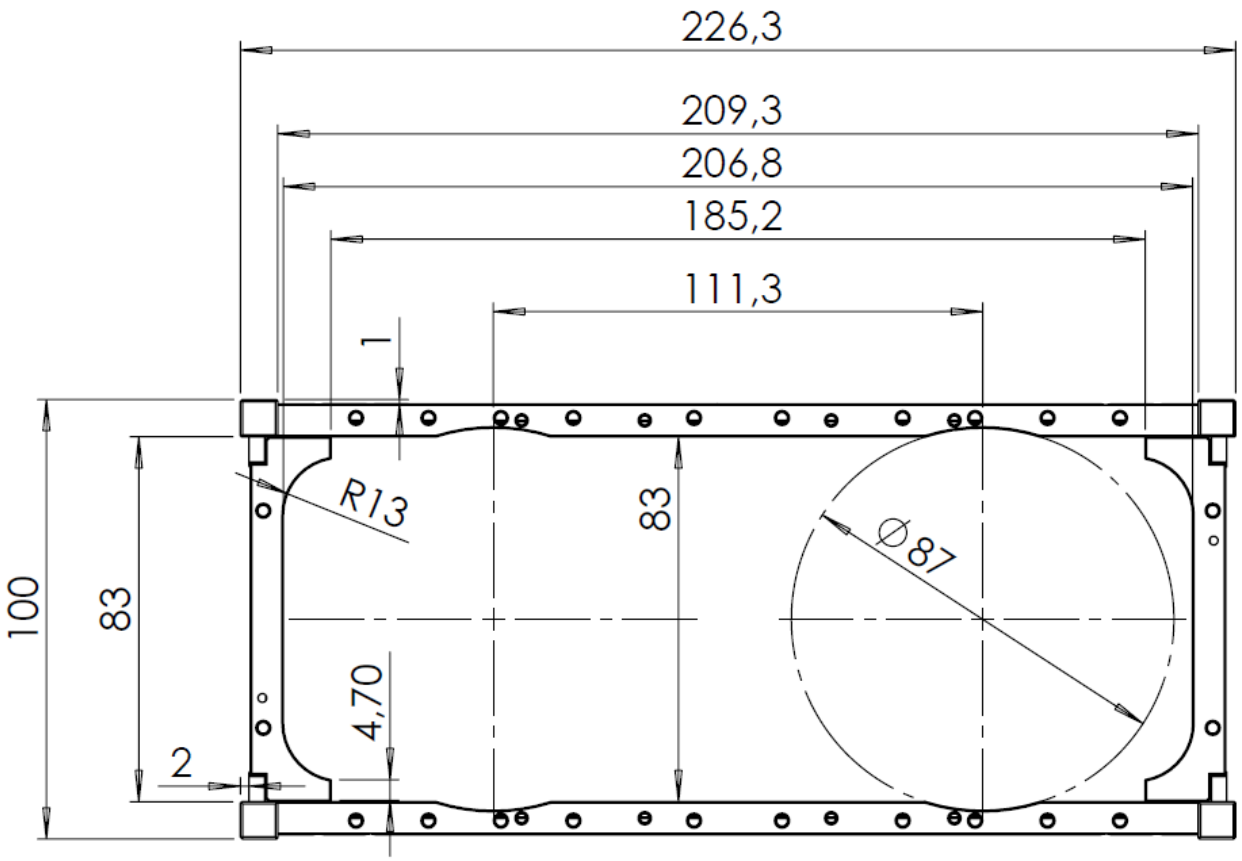
Test		ECSS/ESCC Reference	Major Limits	
Structural and Mechanical	**Quasi-static test**	ECSS-E-ST-10-03C	Frequency [Hz]	30
			Level [g]	15 (+/-10%)
			No cycles/burst	19
			No of full load cycles/burst	7
			No of burst	1 in each direction
			Directions	X Y Z
	Random Vibration	ECSS-E-ST-10-03C	NASA GEVS levels	
			Frequency [Hz]	ASD Level [g^2/Hz] (+/-3db)
			20	0.026
			20-50	+6 dB/Oct
			50-800	0.16
			800-2000	-6 dB/Oct
			2000	0.026
			Overall	14.1 G_{rms} (+/-10%)
	Sinusoidal Vibration	ECSS-E-ST-10-03C	Sweep rate: 2 octaves / minute	
			Frequency [Hz]	**Level**
			5-8	10 mm(0-p)
			8-100	4.5G (+/-10%)
	Mechanical Shock	ECSS-E-ST-10-03C	*Shock levels based on Q = 10 quality factor*	
			Frequency [Hz]	Level [g] (+/- 6db)
			100	40
			1000	1000
			2000	1500
			10000	1500

Disclaimer: the overall mass of a s/c and placement of masses might lead different results if changed.
For further information about the tests please contact GomSpace.

8 Mechanical Drawing

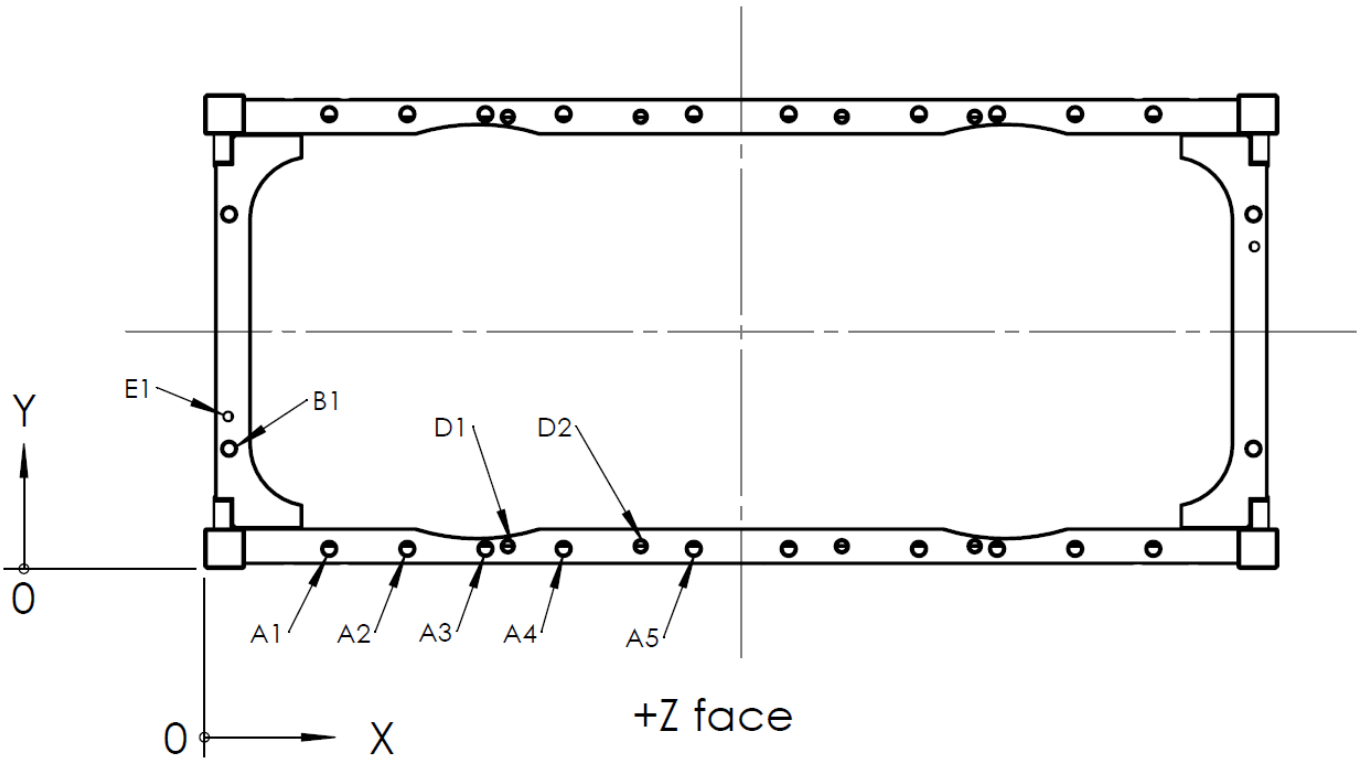
All dimensions shown in mm.

8.1 Z-face (2U Side) - General Dimensions

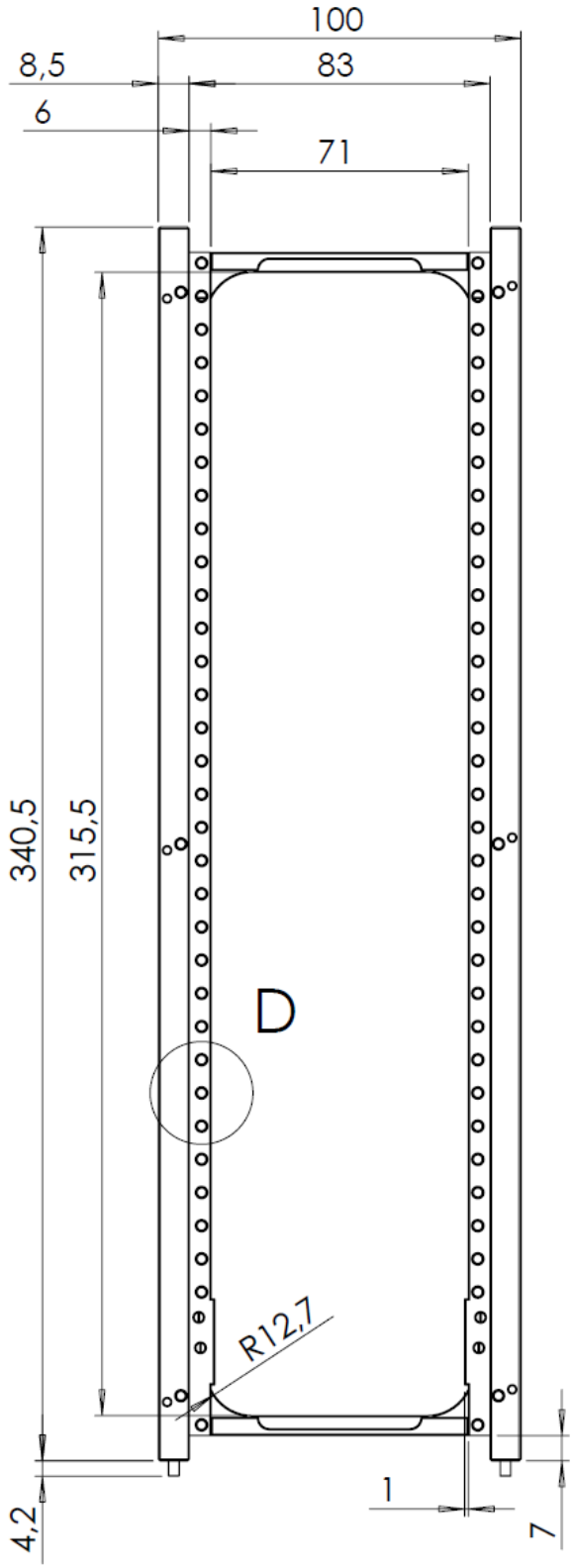


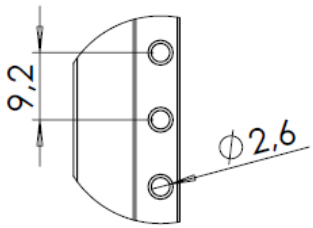
8.2 Z-face (2U Side) - Hole Callouts

Hole Table			
TAG	X LOC	Y LOC	SIZE
A1	26,30	4,20	M2.5x0.45 SCREWLOCK HELICOIL Insert = 1.5 * Dia. Do NOT apply Loctite or similar
A2	42,77	4,20	
A3	59,24	4,20	
A4	75,70	4,20	
A5	103,15	4,20	
B1	5,21	25,30	M2.5x0.45 SCREWLOCK HELICOIL Insert = 1.5 * Dia. Do NOT apply Loctite or similar
D1	63,95	4,75	M2x0.4 SCREWLOCK HELICOIL Insert = 2.0 * Dia. Do NOT apply Loctite or similar
D2	91,95	4,75	M2x0.4 SCREWLOCK HELICOIL Insert = 2.0 * Dia. Do NOT apply Loctite or similar
E1	5,01	32,10	∅ 2 Note: Skew-symetric around only one of the symetry lines



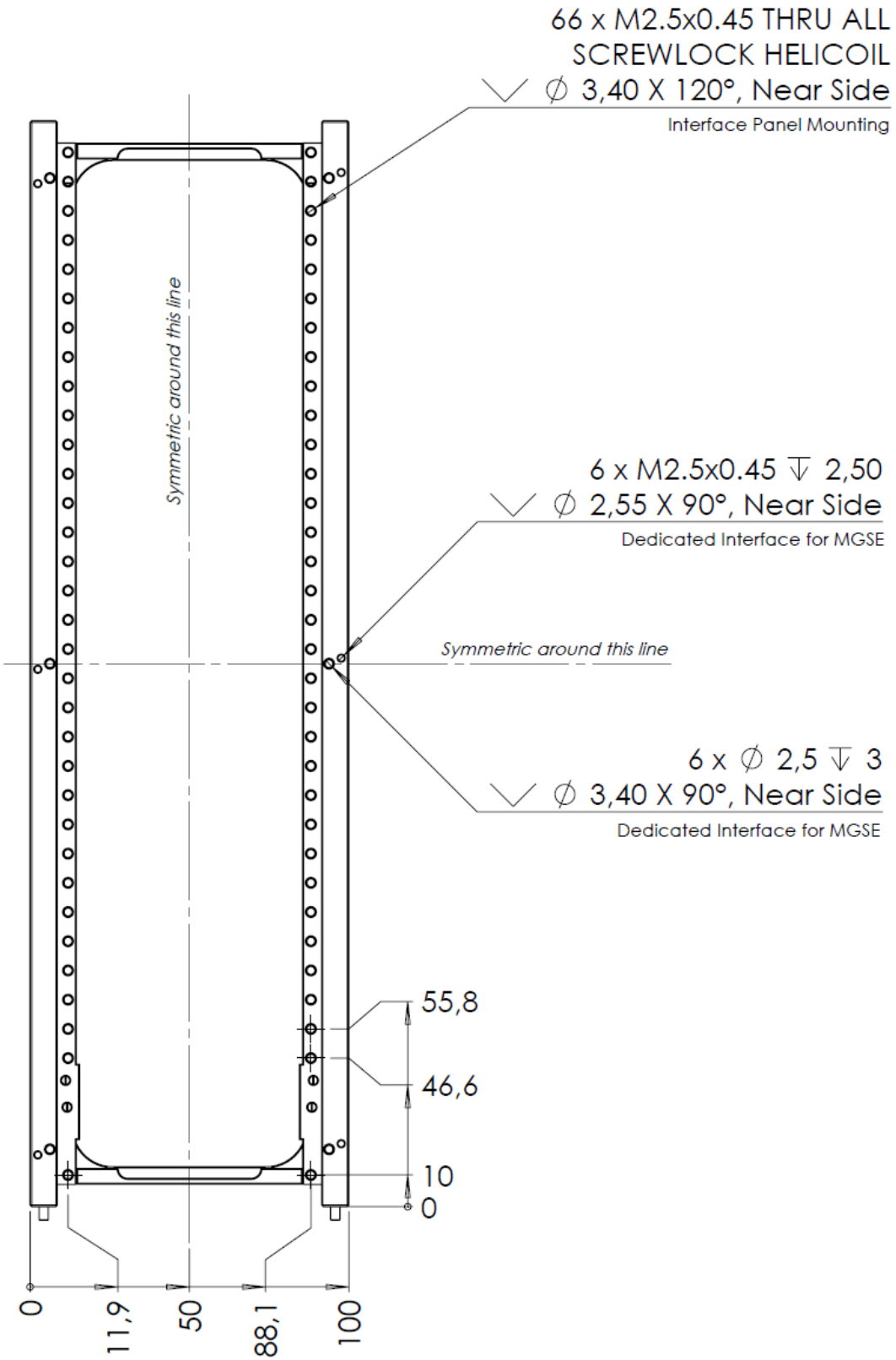
8.3 X-Face (3U Side) - General Dimensions



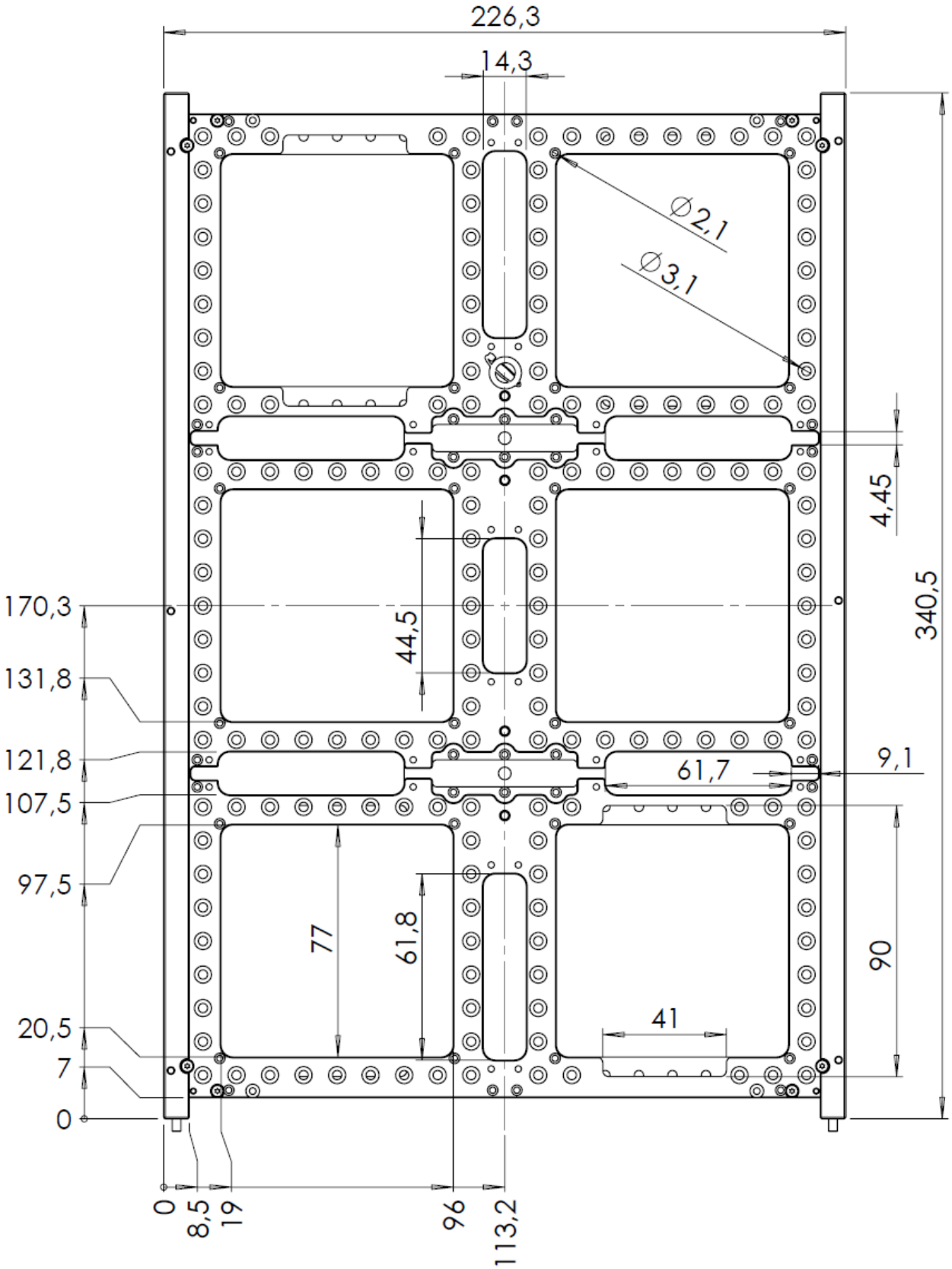


Wall Intergration View - D

8.4 X-Face (3U Side) - Hole Callouts



8.5 Y-Face (6U Side) – General Dimensions



8.6 Y-Face (6U Side) – Hole Callouts