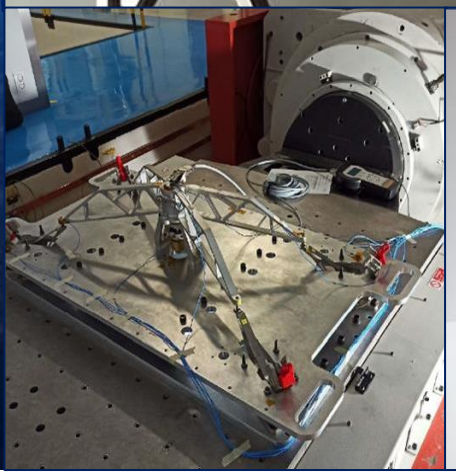

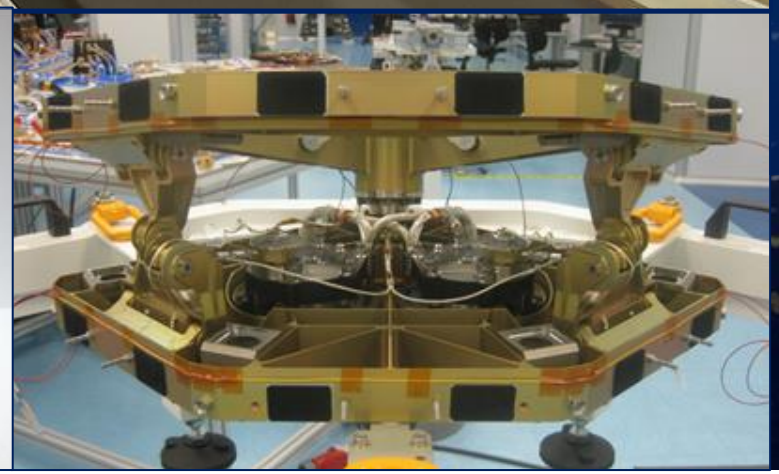

Mechanisms Products ADSM

DEFENCE AND SPACE

MECHANISMS PRODUCTS SP

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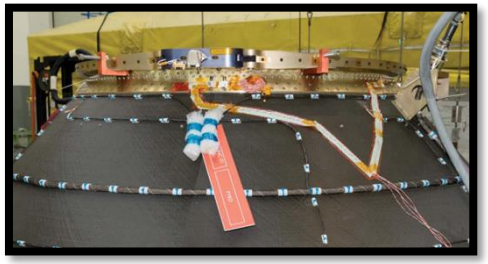
Clamp Band Separation Mechanisms



LPSS1194

LPSS 1875 & LPSS 937

LPSS 2105 & LPSS937

CRSS 3936

CRSS 937

Satellite Separation – whatever size and type of mission– requires a Separation System. Most common type of Satellite Separation Mechanisms are clamp-bands being Airbus DS one of the most relevant worldwide providers of this type of systems.

The heritage of Airbus DS Satellite Separation Systems is, up to date, higher than 200 successful flights for the more relevant launchers in the market. Ariane 5, Vega, Falcon 9, Rockot, Soyuz and H-IIA are examples of launchers where ADS clamp-bands have flown.

Mechanisms Products SP

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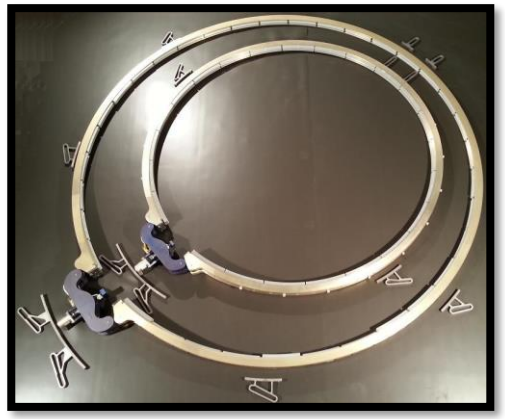
LPSS Family



LPSS – 610 / 937 / 1194 / 1666 / 1875 / 2105

Main LPSS performances:

- LPSS ranges from 610mm up to 2105mm of satellite ring diameter being the family flagship the LPSS1194 clamp-band.
- The whole family is equipped with a passive shock reduction mechanism to provide the payload with a comfortable shock at the release event.
- High load carrying capability and weight optimization are key characteristics of this family.
- For the most common diameters (937 and 1194) a light version is available.

System	Diameter [mm | classic I/F [in]	Mass [kg]	Clamps Angle Upper/Lower [deg]	Ultim.(**) line load [N/mm]	Tension [kN]	Average Shock [g]	Funct. Temp. [°C]
LPSS610	610 | 24	5.4	15/15	80	15	≈800	-55/120
LPSS937	937 | 37	13.0	15/9	380	35	≈900	-55/120
LPSS937L	937 | 37	8.0	15/15	105	24	≈600	-55/120
LPSS1194	1194 | 47	15.0	15/9	480	50	≈900	-40/111 (-55/120)
LPSS1194L	1194 | 47	8.8	15/15	73	24	≈600	-55/120
LPSS1575*	1575 | 62	18	15/9	250	45	≈700	-55/120
LPSS1666	1666 | 66	23.0	11/11	250	45	≈700	-55/120
LPSS1875	1875 | 74	18.7	15/15	156	40	≈700	-55/120
LPSS2105	2105 | 83	17.5	20/15	35	30	≈700	-55/120

(*) In development, TRL7 mid 2026
(**) Max, tested value

Clamp Band Separation Mechanisms

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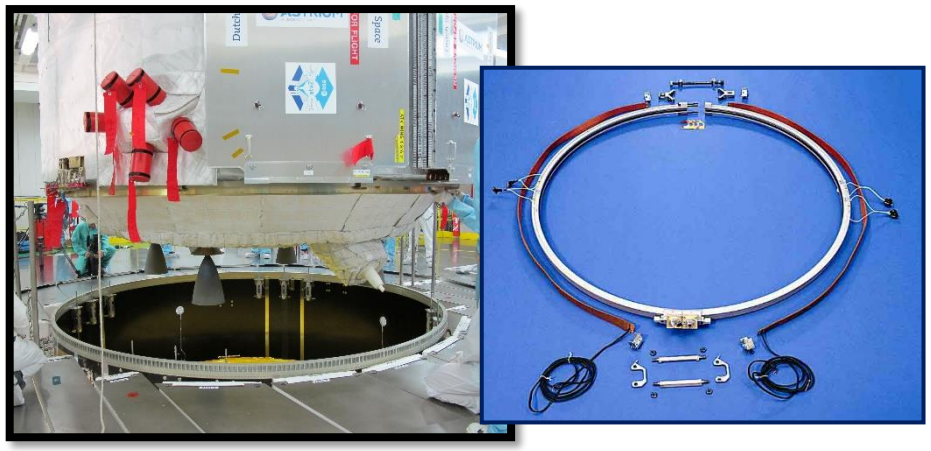
CRSS Family



CRSS – 937 / 1194 / 2624 / 3936 / 4272

Main CRSS performances:

- CRSS ranges from 937mm up to 4272mm of satellite ring diameter.
- Thermal tensioning operation.
- Two redundant pyro-cutters activate the clamp-band release.
- High load carrying capability is one of the key characteristics of this clamp-band family.
- As per LPSS family, weight optimization has been a must during the development phases.

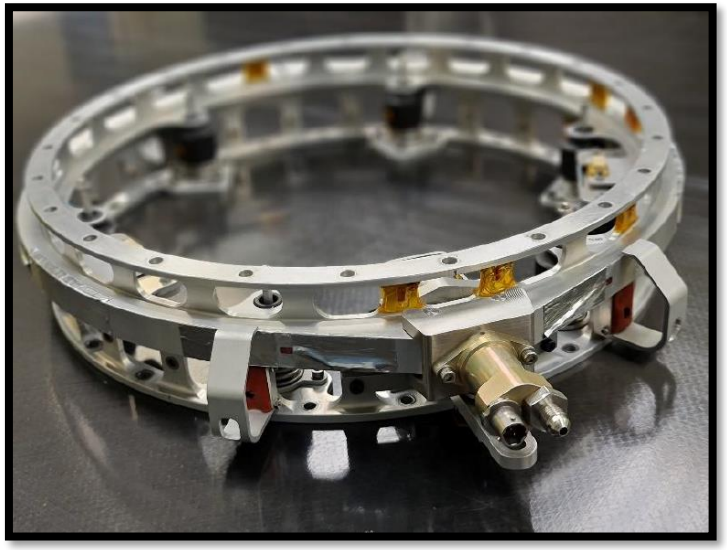
System	Diameter [mm | classic I/F [in]	Mass [kg]	Clamps Angle Upper/Lower [deg]	Ultim.(*) line load [N/mm]	Tension [kN]	Average Shock [g]	Funct. Temp. [°C]
CRSS937	937 | 37	11.3	15/9	94	23	≈2500	-90/100
CRSS1194	1194 | 47	13.0	15/9	338	42	≈2500	-90/100
CRSS2624	2624 | 103	22.1	9/9	286	35	≈1500	-90/100
CRSS3936	3936 | 155	28.0	9/9	166	45	≈1200	-90/100
CRSS4272	4272 | 169	35.0	9/9	125	40	≈1600	-25/55

(*) Max, tested value

Clamp Band Separation Mechanisms

AIRBUS

LCB 380



Main Light Clamp Band performances:

- LCB 380 is a light payload adapter frame mainly for micro/mini spacecraft up to about 200 kg
- It is composed by two rings and a clamp band to provide the necessary load carrying capability rings I/F is 24” holes in 381 mm 15” diameter
- It is provided with six symmetrically distributed spring sets able to furnish from 1 to 12 springs allowing the tailoring of the jettisoning force/energy
- Up to four electrical connectors able to provide a maximum of 60 pins

System	Current Development Status	Diameter [mm | classic I/F [in]	Mass [kg]	Ultim.(*) line load [N/mm]	Tension [kN]	Average Shock [g]	Funct. Temp. [°C]
LCB380	Ready for Flight TRL7	381 | 15	3.65	89	10	<700/200(**)	-55/130

(*) Max, static tested value (FLL=71.1N/mm)
Sine quasistatic test 12.7g to 161kg
(**) <700g using pyro nut for release
<200g using NEA for release

Clamp Band Separation Mechanisms

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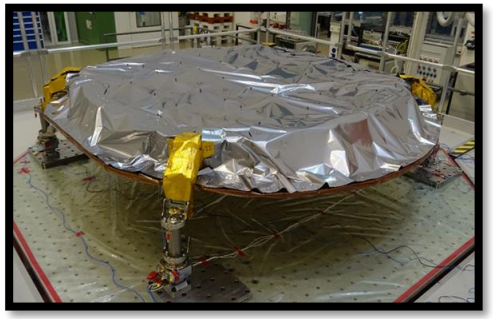
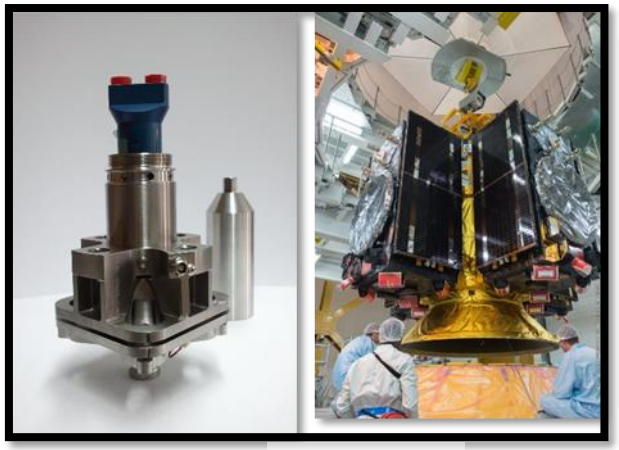
Hold Down and Release Mechanisms

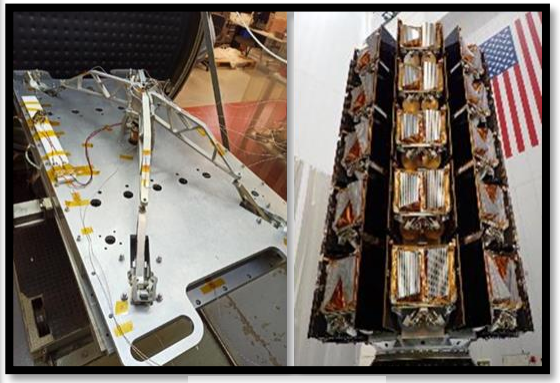
HRM



DUAL HRM



HRS



MSD

Hold Down and Release Mechanisms are the most common type of single point Satellite /Antenna /Solar array Separation Mechanisms being Airbus DS a worldwide provider of this type of systems.

The heritage of Airbus DS Hold Down and Release Mechanisms is, up to date, higher than 900 successful releases in flight for different dispensers and Satellites including Galileo constellation

Mechanisms Products SP

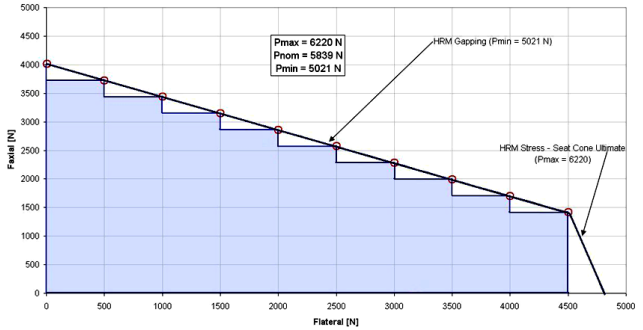
AIRBUS

HRM

Main HRM performances:

- Hold-down and release mechanism sized to release Reflectors, Panels, Antennas, small Satellites….
- Released by pyro-actuator providing good synchronizations and quick release.
- 100% Testing secures Quality and Product Reliability.
- Streamlined Manufacturing & Verification Flow:
  - Guarantees in-time deliveries.
  - allows Competitive Prices decreasing with Batch Size

System	Flight Heritage	Envelope [mm]	Mass [kg]	Nominal Preload [kN]	Load Capability [N]	Shock Induced [g]	Temp. Range [°C]
HRM	>800	D40 x 120	0.75	5.8	Combined Faxial=2500 Flateral=2500	≈2000	Op: -80/75 Non-Op: -85/100

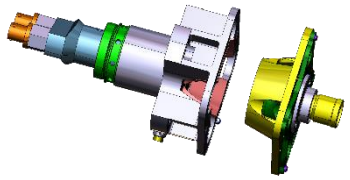


HRMA Performances		
PARAMETER	**UNITS**	**VALUE**
Lateral Stiffness	N/m	>1.5E6
Axial Stiffness	N/m	>9E6
Alignment Capability (additional to the Angular and Vertical ones provided by the HRM)		
In-plane	mm	±4.5
Height (HRM bottom I/F to s/c I/F, i.e. support cone height)	mm	60 to 180
Mass (with ME042AA Sepnut and Initiators)	Kg	0.60 to 0.74
Load Capability	N	See Figure
Shock emission (measured on s/c at 200mm from HRMA I/F)	< 1250g's, 2500 Hz ½ sine pulse; or < 2000 g's, Q=10 SRS	

Hold Down and Release Mechanisms

AIRBUS

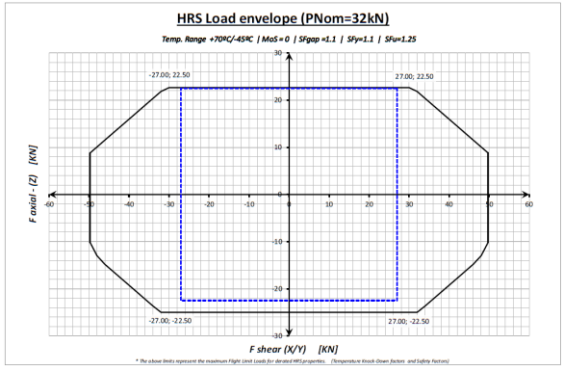
HRS



Main HRS performances:

- Hold-down and release mechanism sized to release Satellites
- Released by pyro-actuator providing good synchronizations and quick release.
- Allows preload corrections at anytime with the HRS installed.
- Cancellation of integration induced loading, by providing 6 DoF adjustment capability among I/Fs.

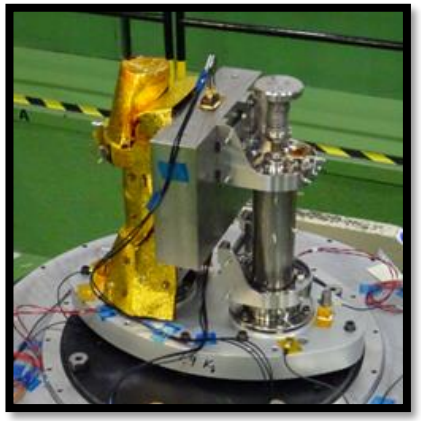
System	Flight Heritage	Envelope [mm]	Mass [kg]	Nominal Preload [kN]	Load Capability [N]	Shock Induced [g]	Temp. Range [°C]
HRS	>60	D90 x 200	1.3	32	Combined Faxial=22500 Flateral=27000	≈2000 in plane ≈5000 out of plane	Op: -45/70 Non-Op: -45/70
HRD No-pyro	In development TRL8 in 2026	D160 x 254	2.0	70	Combined Faxial=40000 Flateral=40000	≈1000 in plane ≈1000 out of plane	Op: -30/70 Non-Op: -10/40

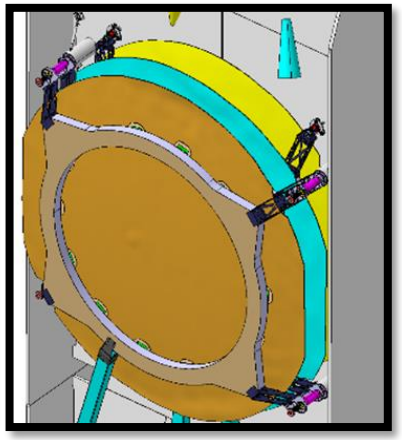


Hold Down and Release Mechanisms

AIRBUS

DUAL HRM

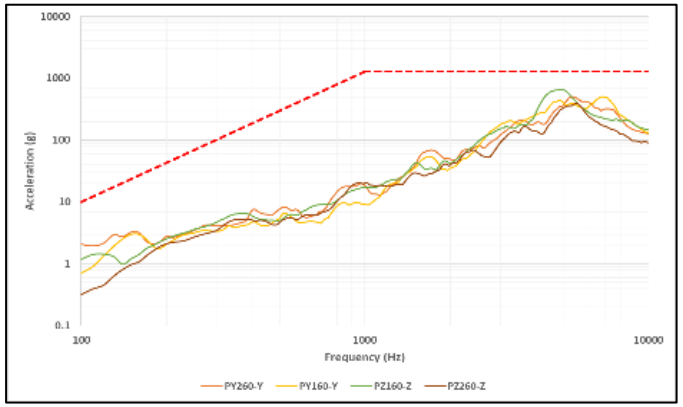




Main DUAL HRM performances:

- Hold-down and release mechanism sized to release two reflectors with one single actuator.
- Released by non-pyrotechnical actuator providing low shock.
- Lower joint conical to provide higher stiffness to the reflector stack
- Upper joint similar to generic HRM (cone+sphere)

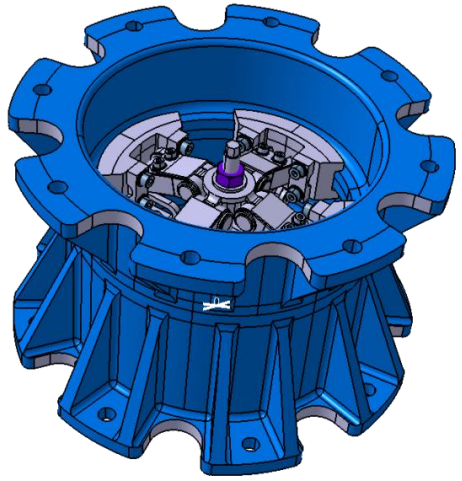
System	Flight Heritage	Envelope [mm]	Mass [kg]	Nominal Preload [kN]	Load Capability [N]	Shock Induced [g]	Temp. Range [°C]
DUAL HRM	>8	D100 x 350	3.2	22.5	Combined Faxial=3100 Flateral=2500	<1000	Op: -115/135 Non-Op: -115/135



Hold Down and Release Mechanisms

AIRBUS

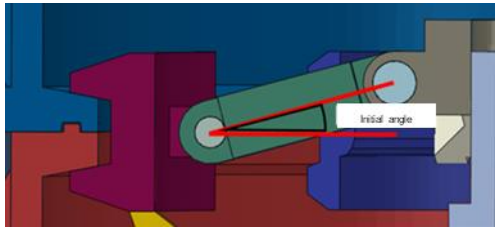
HICHAP

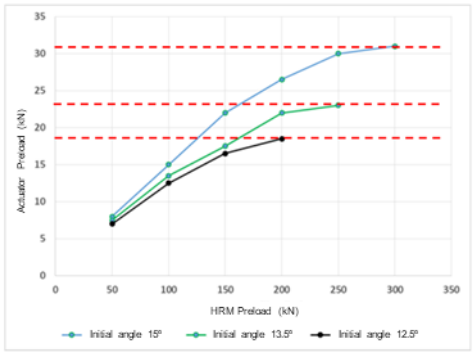


Main High Capability Hold Down performances:

- Hold-down and release mechanism sized to release big Satellites
- Released by non-pyrotechnical actuator providing low shock.
- High load capability >200kN preload between I/Fs
- Low preload at actuator level, preload Actuator / I/F ratio 1:10

System	Current Development Status	Envelope [mm]	Mass [kg]	Nominal Preload [kN]	Actuator Preload [kN]	Load Capability [N]	Shock Induced [g]	Temp. Range [°C]
HICHAP	TRL6 in 2026	D214x130	8.5	200	20	Combined Faxial=170000 Flateral=65000	<1000	-55/120

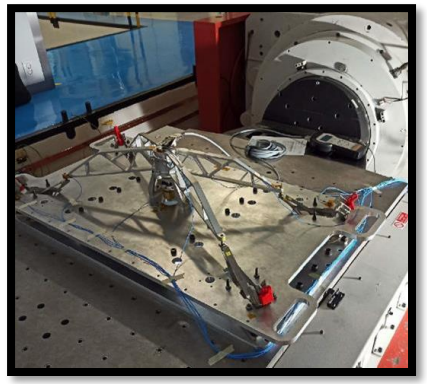




Hold Down and Release Mechanisms

AIRBUS

MSD



Main Multiple Hold Down Separation Device (MSD)

performances:

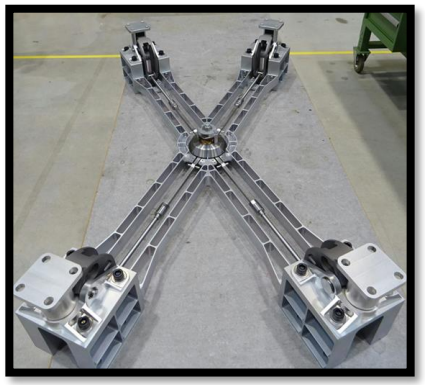
- MSD is an unique multi-point Separation system developed by Airbus DS which uses only **one** non-pyrotechnical actuator to release 4 Hold Down Mechanisms.
- Negligible dispersion in the release of the four HRM points (fully synchronized).
- Reduced flyaway mass.
- Low induced shock.
- Preload monitoring capability until launch.

System	Platform	Flight Heritage	S/C IF [mm]	Mass [kg]	Nominal Preload [kN]	Load Capability per HD [N]	Shock Induced [g]	Temp. Range [°C]
MSD 150	A 150	>150	645 x 456	<7.3	14kN each HD	Combined Faxial=2350 Flateral=4400	<1000	-40/120
MSD 150 R+	A 150	In development TRL7 2026	645 x 456	<9	29kN each HD	Combined Faxial=25000 Flateral=15000	<1000	-40/120
MSD 250	S 250	4	1060 x 499	<8.3	11.5kN each HD	Combined Faxial=5900 Flateral=6900	<1000	-40/120
MSD 450	A 450	Foreseen flights: >40 in 2026 >100 in 2027	645 x 593	<9.5	29kN each HD	Combined Faxial=25000 Flateral=15000	<1000	-40/120

Hold Down and Release Mechanisms

AIRBUS

MSD EVO



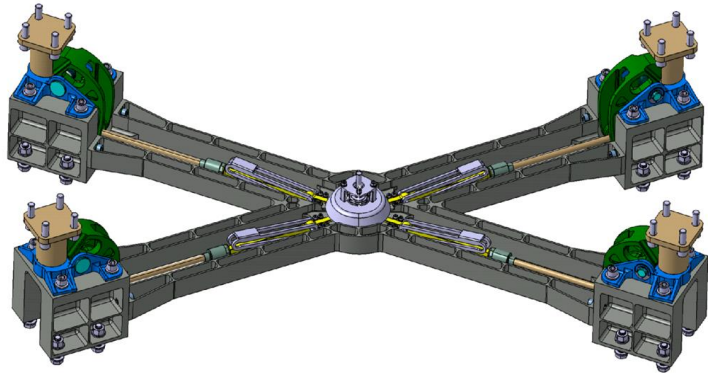
MSD EVO

Main Multiple Hold Down Separation Device EVO (MSD)

improved performances:

- Design upgrade to launcher external assembly.
- Simplify the adaptation to different I/´F´s.
- Dimensioning to increase the S/C mass target > 1000kg
- Preload self supporting structure.

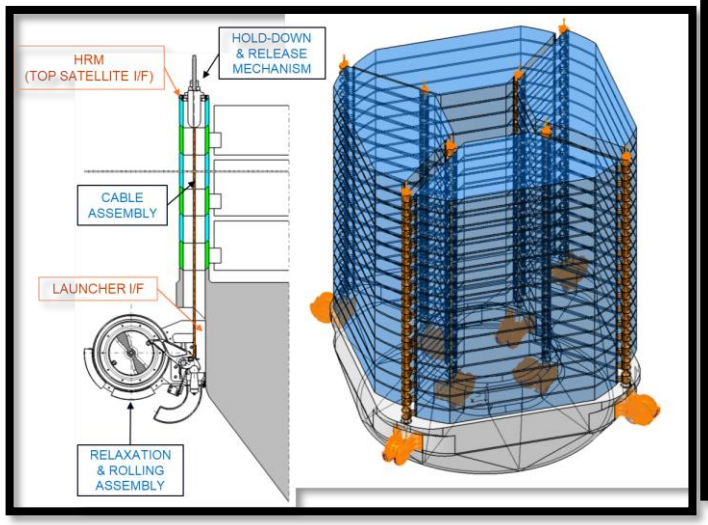
System	Flight Heritage	Envelope [mm]	Mass [kg]	Nominal Preload [kN]	Load Capability [N]	Shock Induced [g]	Temp. Range [°C]
MSD EVO	In development TRL6 2026	Adjustable	<15	60kN each HD	Combined Faxial=45000 Flateral=25000	<1000	-40/120

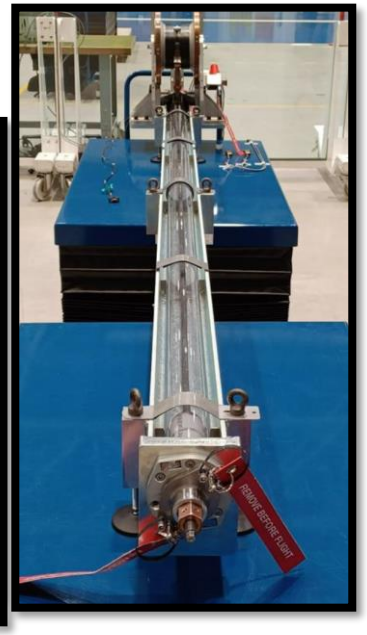


Hold Down and Release Mechanisms

AIRBUS

PACSAT



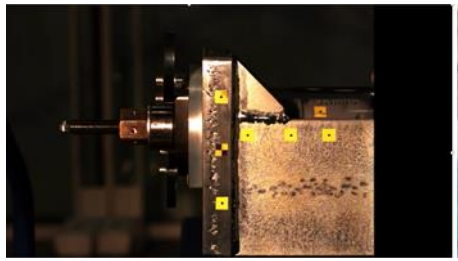


Main Stack Preloading and Release Mechanism

performances:

- Preload , relaxation & release mechanism for stacked satellites, composed by:
- Hold-Down & Release Mechanism: Low shock HDRM Activated by the loss of tension (passive HRM, no release actuator in it)
- Cable Assembly: PBO (Zylon) cable & Stainless Steel end-fittings allowing its rolling due to flexibility
- Relaxation & Rolling Assembly: Single pin puller release actuator with eddy current damper

System	Current Development Status	Dimensions (length) [m]	SC Capability	Ultimate Load (*) [kN]	Tension (**) [kN]	Preloading system
PACSAT	TRL4	6(**)/3(*)	10SCs/500kg each	205	90(**)/30(*)	Hydraulic

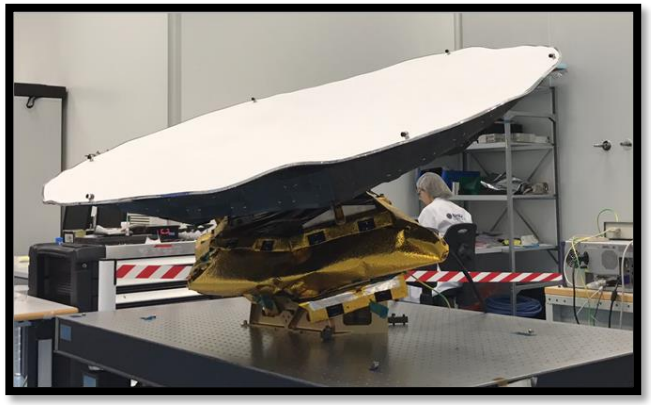


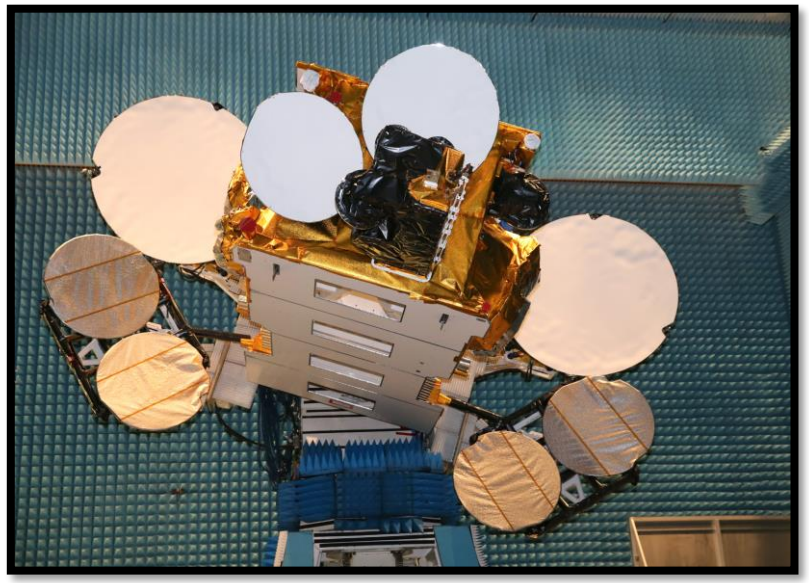
Hold Down and Release Mechanisms

(*) Max, tested value
(**) Maximum by design

AIRBUS

Antenna Pointing Mechanisms

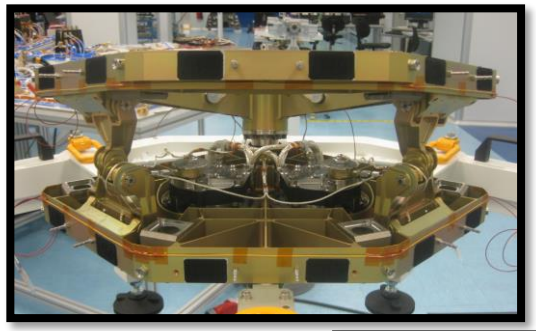




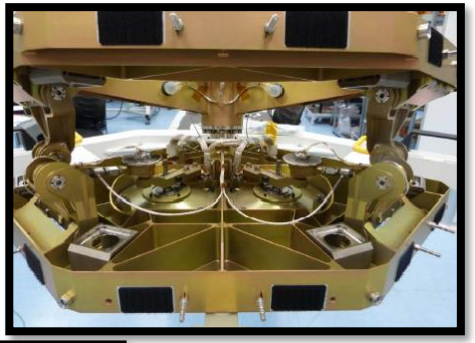
Antenna Pointing Mechanisms developed by Airbus DS is a Hold deployment and pointing system with no need of Hold downs.

The heritage of Airbus DS Antenna Pointing Mechanisms is, up to date, higher than 15 operative systems in flight.

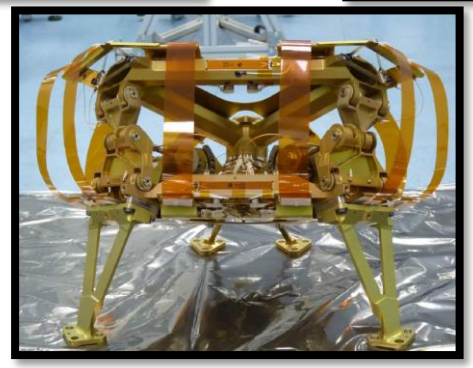
APPs Family



APP1.0



APP1.1



APP2.0

Main APP (Antenna Pointing Platform)

performances:

- No need for hold down during launch and deployment
- Active and Passive thermal control
- Two independent rotation axes
- High pointing ratio conduces to low step size.
- Hysteresis is compensated by the mechanism pointing sequence

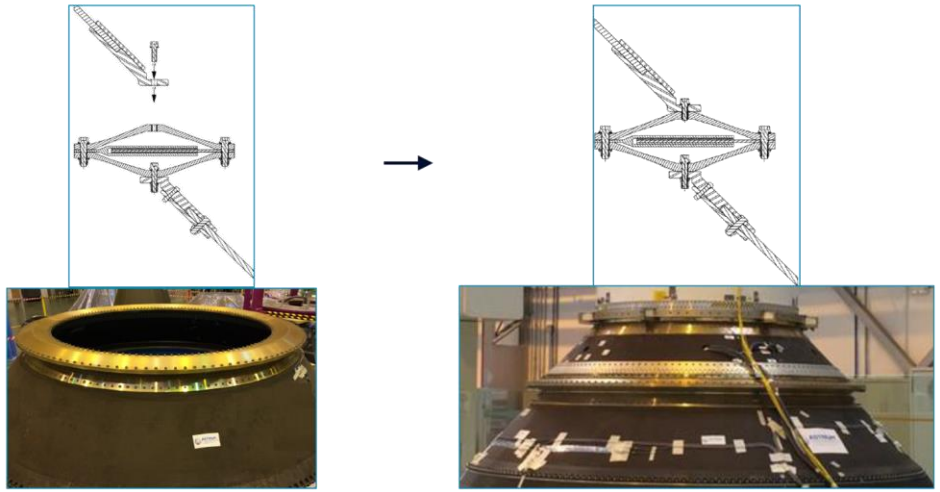
System	Actuator	Flight Heritage	Envelope [mm]	Mass [kg]	Step size [deg]	Pointing Range [deg]	Repeatability [deg]	Telemetry	Reflector Passenger Mass [kg] (*)	Funct. Temp. [°C]
APP1.0	MOOG	2	70x70x25	10.5	<0.0017	±8.9	<0.001	Potentiometer	9.2	Op: -45/95 Non-op: -55/100
APP1.1	CDA	6	70x70x25	8.7	<0.0015	-8.9+6.5	<0.001	Hall Sensor	5.8	Op: -50/95 Non-op: -55/100
APP2.0	CDA	8	60x60x20	8	<0.0011	±5	<0.001	Hall Sensor	2.2	Op: -50/95 Non-op: -55/100

(*) Max, tested value, capability can be increased up to APP1.0 limits

Antenna Pointing Mechanism

AIRBUS

LPA



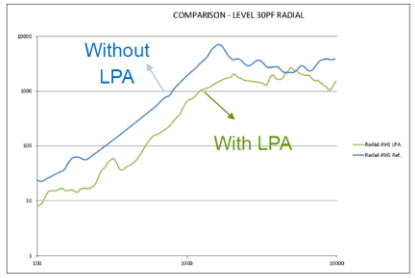
LPA attached to the LVA

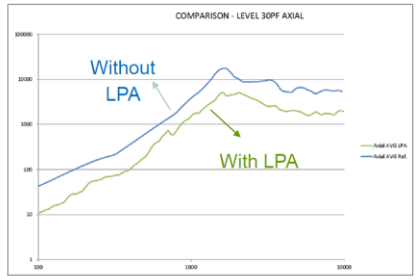
LPA Assembled between the PAF and the LVA

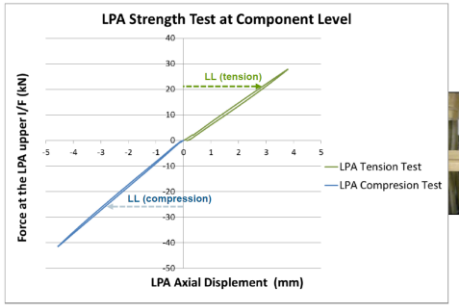
Main LPA (Light Passive Attenuator) performances:

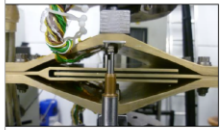
- Good reduction of the amplification of the main modes
- Damping for low frequency vibrations
- Good shock attenuation ~ -9db in radial and axial
- Very simple design, manufacturing and installation
- Linear stiffness up to the limit load and above

System	Current Development Status	Diameter [mm | classic I/F [in]	Height [mm]	Mass [kg]	SC Capability [kg]	Shock Filtering	Funct. Temp. [ºC]
LPA	TRL6	1780 | 70 *But it can be adapted to other diameters	<100	<75	6500	-9 dB	-55/120









LPA StiffnessTest at Subscale Level

Light Passive Attenuator

AIRBUS

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Mechanisms Products SP

(*) Max, tested value, capability can be increased up to APP1.0 limits

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