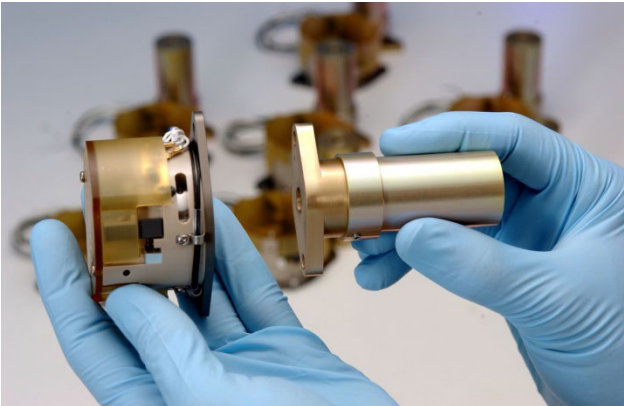


Hold Down Release Mechanism (HDRM)

Design Description

Sierra Space’s Hold Down Release Mechanism (HDRM) is a fast-acting separation nut rated to accommodate several working preloads. The HDRM series uses a conventional segmented separation nut with a redundant shape memory alloy (SMA) trigger that responds to a standard pyrotechnic firing pulse. The SMA trigger allows for fast response times with low release shock. Integral circuit interrupts open trigger circuits upon release, simplifying ground operations and flight control requirements. The HDRM resets and is ready for bolt insertion in less than 1 minute with the supplied reset pin.

The HDRM releases a standard UNF (Unified Fine) high-strength bolt. Our HDRM bolt retractor (offered separately) is a flight-qualified option with a preload measurement using a calibrated load cell and spherical washer set to accommodate angular misalignment. In addition, the bolt retractor features an easily removable cover that facilitates reset.

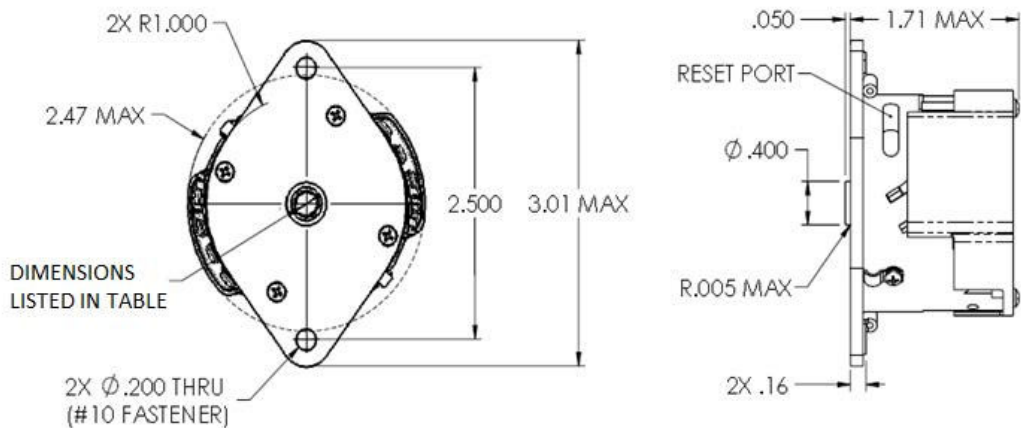


Hold Down Release Mechanism (HDRM).

HDRM Features	
• Uses wide range of initiation pulses	• Millisecond release
• Circuit interrupt feature for simple control	• Low shock
• Eliminates pyrotechnic safety concerns	• Easily reset in place with a simple tool—no refurbishment
• Low mass	• Flight hardware can be repeatedly tested prior to flight
• Redundant, resettable shape memory alloy triggers	• High dynamic load capability

Applications
• Spacecraft-from-launch vehicle separation, solar array hold-down and release, gimbal launch locks and other satellite applications requiring a low-shock, quick release

Dimensions



Note: All dimensions above are in inches.

Heritage Programs	
• Space Test Program Satellite-1 (STPSat-1)	• Communications/Navigation Outage Forecasting System (CNOFS)
• WorldView-1, -2, and -3	• eXperimental Small Satellite 10 (XSS-10)
• Poly Picosatellite Orbital Deployer (P-POD)	• European Space Agency Swarm Satellites for Earth Observation (EO)
• Advanced Extremely High Frequency (AEHF)	• Space Communications and Navigation (SCaN) Testbed
• Cyclone Global Navigation Satellite System (CYGNSS)	• Small Missions for Advanced Research in Technology (SMART-1)
	• FalconSAT-1
• NanoRacks Kaber Microsat Deployer	• Kestral Eye-2M

Product Specifications				
	U.S.		SI	
Mechanical				
Thread	1/4-28 UNF	5/16-24 UNF	No metric equivalent	No metric equivalent
Nominal Working Preload (allows for operating margin and preload uncertainty)	3,400 lbf	4,800 lbf	15,125 N	21,351 N
Maximum Operating Load Capability (higher pre-load versions are currently under development; specs available upon request)	4,000 lbf maximum	5,300 lbf maximum	17,793 N	23,576 N
Release Bolt Replacement Interval	15 recommended (30 qualified) for NAS1351			
Misalignment Capability	±1.5 degrees OR ±0.015-inch lateral		±1.5 degrees OR ±0.381 mm lateral	
Mass	9.52 oz max.		270 g max.	
Life Cycles	>100 full load releases			
Redundancy	Full electrical, partial mechanical			
Operational Margins	>100%			
Source Shock	<400 g		<400 g (expected)	
Reliability	>0.9999			
Random Vibration	36 Grms			
Release Time	15 to 200 msec (over operational environment conditions)			
Electrical				
Power Input	Typical: 45 W @ 3.5 A @ 20 °C			
Release Signal Range for Operating Temperatures	Typical: 3.5 A, 35 msec @ 20 °C Range: 2.3 A to 7 A, 15 msec to 160 msec			
SMA Resistance (single circuit)	3.9 ±0.1 @ 20 °C Ω			
No-fire Current	0.25 A min.			
All-fire Current (200 msec)	2.3 A			
Lead-wire	4x 22 AWG (Mil-W-22759/33)			
Thermal				
Operating Temperatures	-49 °F to +167 °F		-45 °C to +75 °C	
Nonoperating Temperatures	-112 °F to +167 °F		-80 °C to +75 °C	
Reset				
Tools Needed	Ø.1250-inch gauge pin			
Reset for HDRM	<1 minute (ready for bolt insertion)			
Note: This data is for information only and subject to change. Contact Sierra Space for design data.				