

# Datasheet

## Nano Release Nut (nD3RN)

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# Description

The DCUBED Nano Release Nut (nD3RN) is a Shape Memory Alloy (SMA) based release actuator which locks sensitive equipment during launch and safely releases it on orbit. It is one of the smallest, yet powerful space-qualified HDRM solutions on the market. Moreover, it is easily resettable (on-ground, in-space), easy-to-use and readily available as a COTS part.

Specifications	Nano Release Nut (nD3RN)
Body Size (L x W x H)	17 x 17 x 17 mm (Standard Interface)
Mass	25 grams
Material	1.4404 / 316L, Surface Treated Stainless Steel
Operating Temperature Range	-65°C to +80°C (TBC)
Nut Dimensions	Ø7 mm x 13 mm Length
Max Preload (Axial)	250 N*
Max Angular Deviation	±3° Cone (≥ 150 mm lever arm)
Max Sideload Angle	±10° Cone
Nut Push-out Force	11±4 N
Rapid Resetability	Yes (on-ground and in-space)
Redundancy	Redundant Wiring and Redundant SMA
Release Shock	<300g (Ultra-Low-Shock)
Reset Cycles	>400
TRL	9

\*Achieved via internal lubrication with space certified solid lubricant (Molykote 106). For sensitive optical applications, the lubricant can be omitted upon request.

# Interfaces

## Mechanical Interfaces

The standard mechanical mounting configuration for the nD3RN is comprised of two threaded M2 holes as shown in Figure 1.

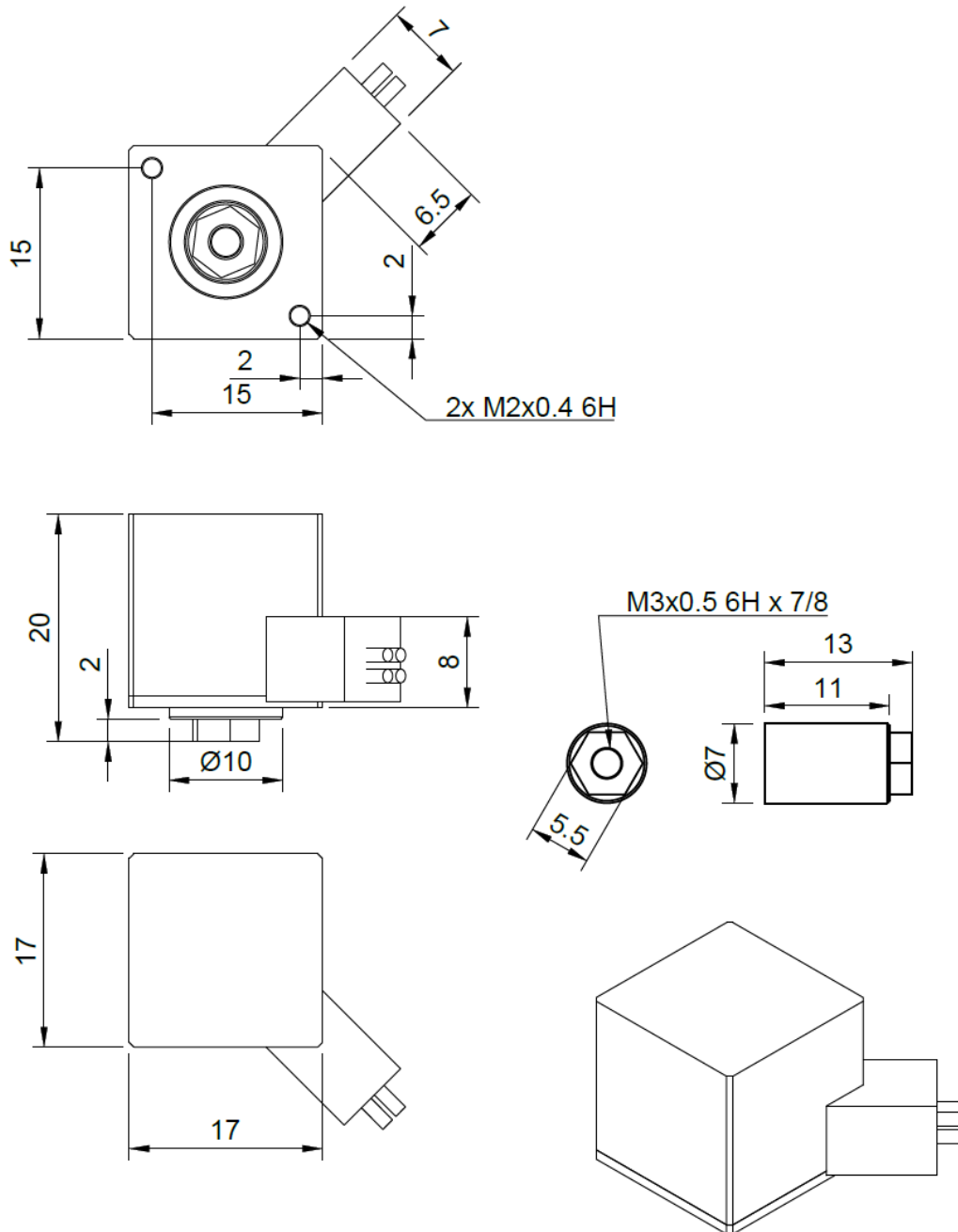
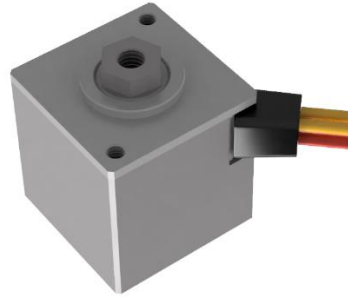


Figure 1: Dimensions and standard mechanical interfaces.

Besides the standard two point mount, custom interface plates are available to achieve any custom interface mounting (e.g. 3-point, 4-point).

## Electrical Interfaces

The standard electrical interface of the nD3RN is shown in Figure 2.



*Figure 3: Electrical wiring of the nD3RN.*

To trigger the release nut, a current must be applied across one of its actuation lines. The actuation lines are color-coded as red and yellow wires pairs (red-red, yellow-yellow). The actuation line behaves like a simple resistor (see the table below), with no specific polarity.

Electrical Details		
Activation Leads	2 x 2 (1 Primary Pair, 1 Redundant Pair)	
Wire Length	>200 mm	
Material	Silver-plated Copper, PTFE	
Wire Gauge	24 AWG	
Actuation Current	1.6 to 2 A (DC)	
Resistance ( $\Omega$ )	0.9 $\pm$ 0.2 $\Omega$	
Time to Trigger** (at 2 A)	0°C	2 sec
	20°C	1.3 sec
	60°C	0.5 sec

\*\*More detailed specifications regarding temperature and current dependent trigger times can be found in the DCUBED user manual. It will be made available upon order placement.

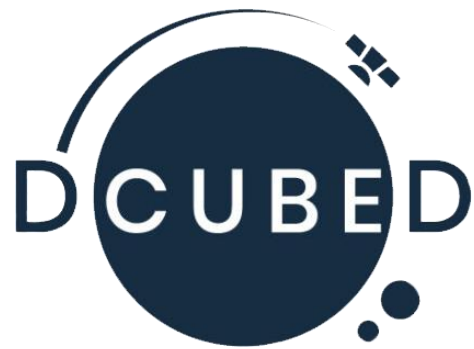
# Loads

The nD3RN is designed to survive the following mechanical loads.

Details	Load Level	Note
Random Vibration (X, Y, Z)	22 GRMS (PSD)	1st Eigenfrequency: >3kHz
Sinusoidal Vibration (X, Y, Z)	20 g	20-130 Hz
Shock (X, Y, Z)	100 Hz: 100 g 1000 Hz-10000 Hz: 1000 g	SRS
Max Preload (Axial)	250 N	-
Nut Push-out Force	11±4 N	-
Survival Loads	500 N Pull-out 1500 N Shear	Using a Stainless Steel M3 Bolt

# Disclaimer

Please note, this is **not** the user manual. The more elaborate, user manual will be made available by DCUBED upon placement of an order.



**Contact us,  
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