



Datasheet

Micro Release Nut (uD3RN)

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Last updated on:
11.04.2023

Description

The DCUBED Micro Release Nut (uD3RN) 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 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	Micro Release Nut (uD3RN)
Body Size (L x W x H)	25.5 x 25.5 x 25.5 mm (Standard Interface)
Mass	80 grams
Material	1.4404 / 316L, Surface Treated Stainless Steel
Operating Temperature Range	-65°C to +80°C (TBC)
Nut Dimensions	Ø10 mm x 19.5 mm Length
Max Preload (Axial)	2000 N*
Max Angular Deviation	±TBD° Cone (≥ TBD mm lever arm)
Max Sideload Angle	±TBD° Cone
Max Nut Push-out Force	20 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	6 (9 in 2023)

*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 uD3RN is comprised of two threaded M3 holes as shown in Figure 1.

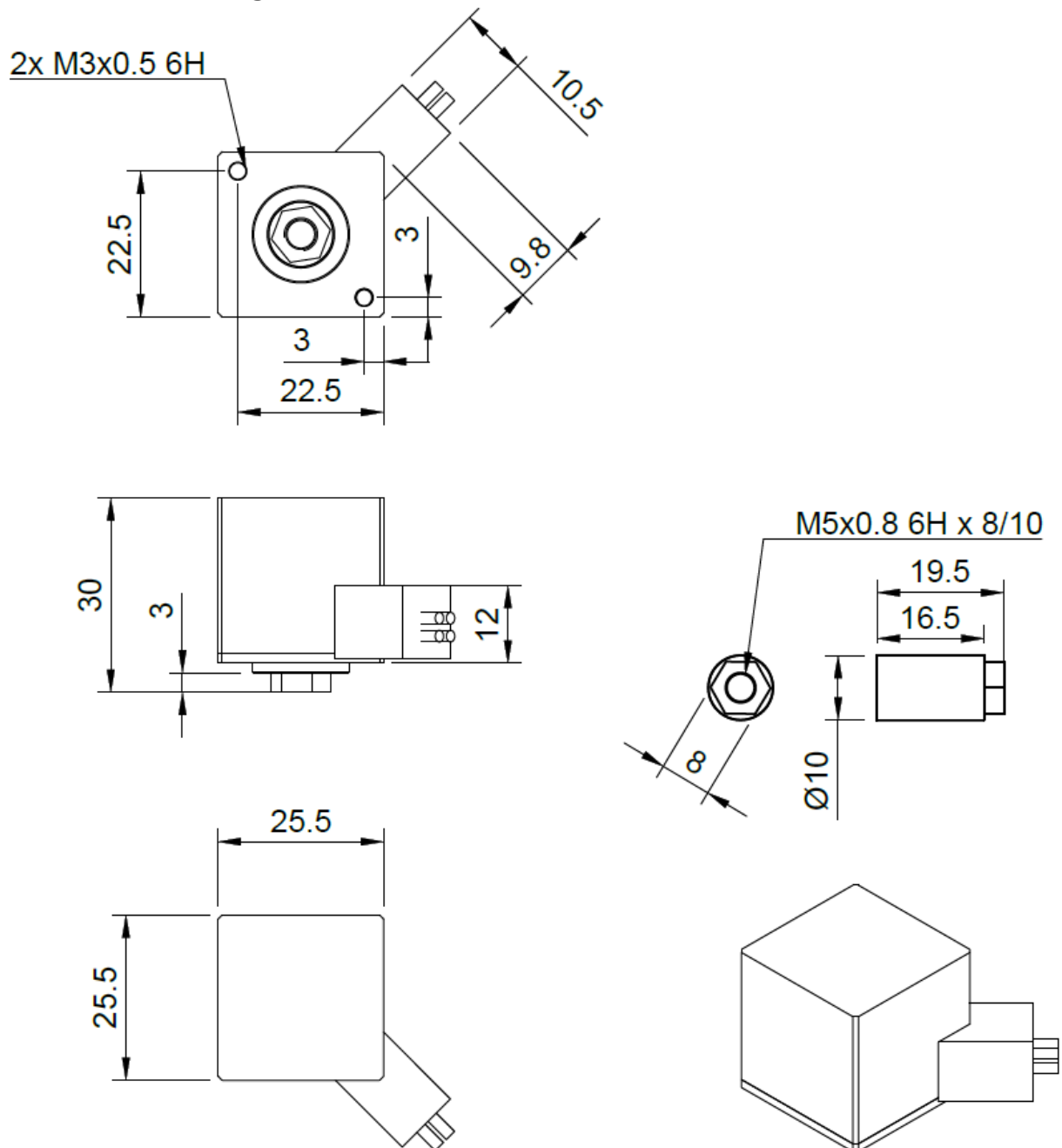


Figure 1: Dimensions and standard mechanical interfaces.

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 uD3RN is shown in Figure 2.

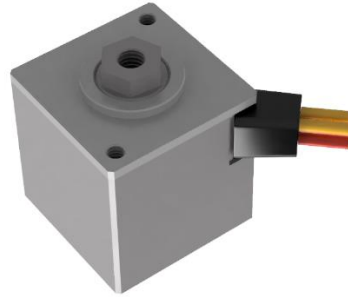


Figure 3: Electrical wiring of the nD3RN.

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 (Ω)	1.2 \pm 0.2 Ω	
Time to Trigger** (at 2.0 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.

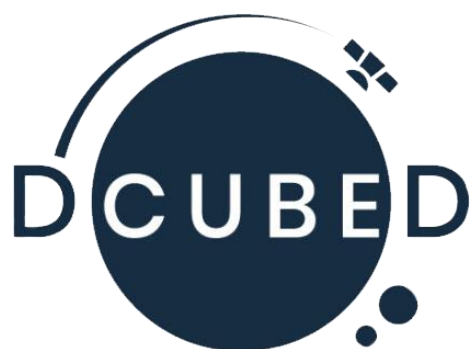
Loads

The uD3RN is designed to survive the following mechanical loads.

Details	Load Level	Note
Random Vibration (X, Y, Z)	22 GRMS (PSD)	1st Eigenfrequency: >1.7kHz
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)	2000 N	–
Max Nut Push-out Force	20 N	–
Survival Loads	4000 N Pull-out 5000 N Shear	Using a Stainless Steel M5 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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