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Datasheet
Micro Pin Puller (uD3PP)

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Description

The DCUBED Micro Pin Puller (uD3PP) is a Shape Memory Alloy (SMA) based release actuator which secures 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, easy-to-use and readily available as a COTS component.
A video showing the simple actuation and the easy reset can be found here.

Specifications/Configuration	Aluminum-Titanium (1-13-1)
Body Size (L x W x H)	25.5 x 25.5 x 25.5 mm
Mass	40 grams
Material	**Body**: Hard anodized Aluminum 7075-T7351 **Pin**: Titanium Grade 5
Operating Temperature Range	-65°C to +75°C (TBC)
Pin Dimensions	Ø5 mm x 6.5 mm
Stroke	6.5 mm
Maximum Sideload (Shear)	250N
Rapid Resetability	Yes
Redundancy	Redundant Wiring and Redundant SMA
Internal Actuation Sensor	Yes (Leads: AWG 26)
Shock Pad	Yes
Release Shock	<TBD g (Ultra-Low-Shock)
Reset Cycles	>200 (TBC)
TRL	7 (9 in 2024)

Interfaces

Mechanical Interface

The standard mechanical mounting configuration for the uD3PP is comprised of two threaded M3 holes as shown in Figure 1 as well as an M3 inside the Pin. For the Aluminum-Titanium version, Helicoils are used for all threads inside aluminum parts.

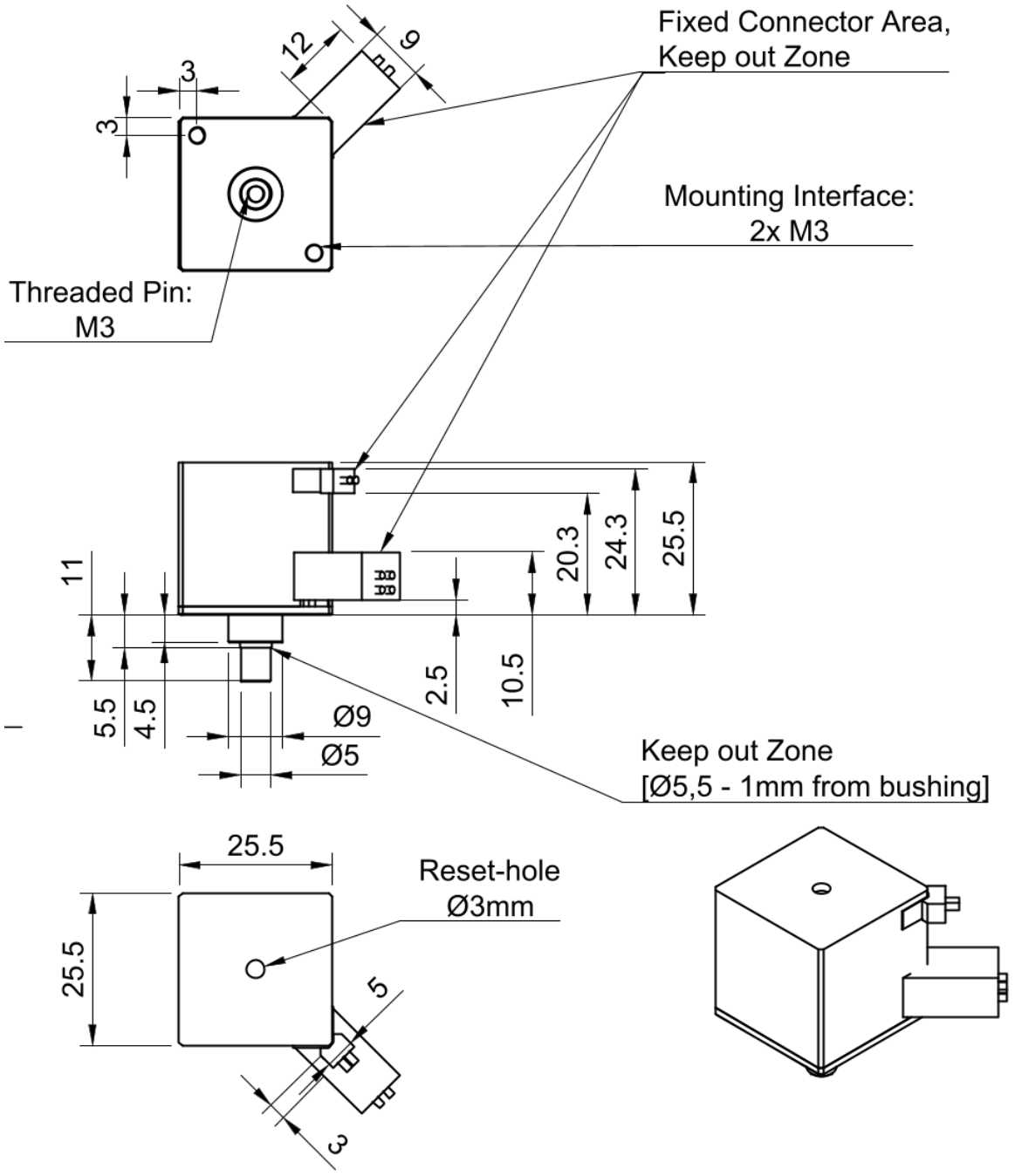

Figure 1: Dimensions and standard mechanical interfaces.

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

Electrical Interface

The standard electrical interface of the uD3PP is shown in Figure 2.

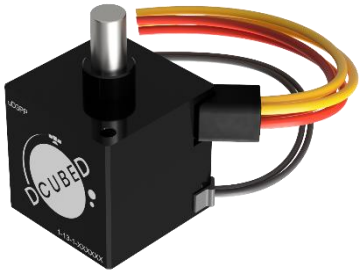

Figure 2 Electrical wiring of the uD3PP.

To trigger the pin puller, a current must be applied across one of its actuation lines. The actuation lines are color-coded as red and yellow wire pairs (red-red, yellow-yellow). The actuation line behaves like a simple resistor (see the table below), with no specific polarity. The black wires are for the actuation sensor, which produces a binary telemetry signal following actuation. (i.e. open/closed circuit).

Electrical Details		
Activation Leads		2 x 2 (1 Primary Pair, 1 Redundant Pair)
Wire Length		>200 mm
Material		Silver-plated Copper, PTFE Fulfills MIL-W-16878/4 (Type E)
Activation Wire Gauge		24 AWG
Actuation Current		1.6 to 2 A (DC)
Resistance (Ω)		0.9 ± 0.2 Ω (@ Room Temperature)
Max current allowed after actuation		< 200 mA
Sensor Wire Gauge		28 AWG
Estimated trigger time* (at 2.0 A and 200 N sideload)	-40°C	TBD sec
	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 uD3PP 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: TBD g 1000 Hz-10000 Hz: TBD g	SRS
Release Load	250 N (shear)	Maximum side load under which the pin retracts
Pin Retraction Force	100 N (axial)	Maximum axial force the pin is retracted with
Ultimate Load Rating	120 N Push-in Load (axial) 3000 N Sideload (shear)	Maximum loads which the actuator can survive but not actuate under

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. The specifications contained herein are all nominal which represent our current production. The products described may be subject to change. The images shown are for illustration purposes only and may not be an exact representation of the product.

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