



**K1DM3 Design Note: 872-LTN1040**  
Setting Limit Switch Positions for Destaco Clamps  
5 November 2018  
By Chris Ratliff

**INTRODUCTION**

Modified Destaco clamps are used to clamp and unclamp K1DM3 while it is in its deployed state. It is important to have feedback if the clamps are fully over-center and clamped or fully unclamped. Here we go through a procedure of setting the switch positions to get the proper feedback for our control system

For background information, a deploy position Destaco clamp is shown in the photo in Figure 1. The switch part number is Destaco 810169, a specification is given in Figure 2 and they reside in the extruded channels of the Destaco clamp body.

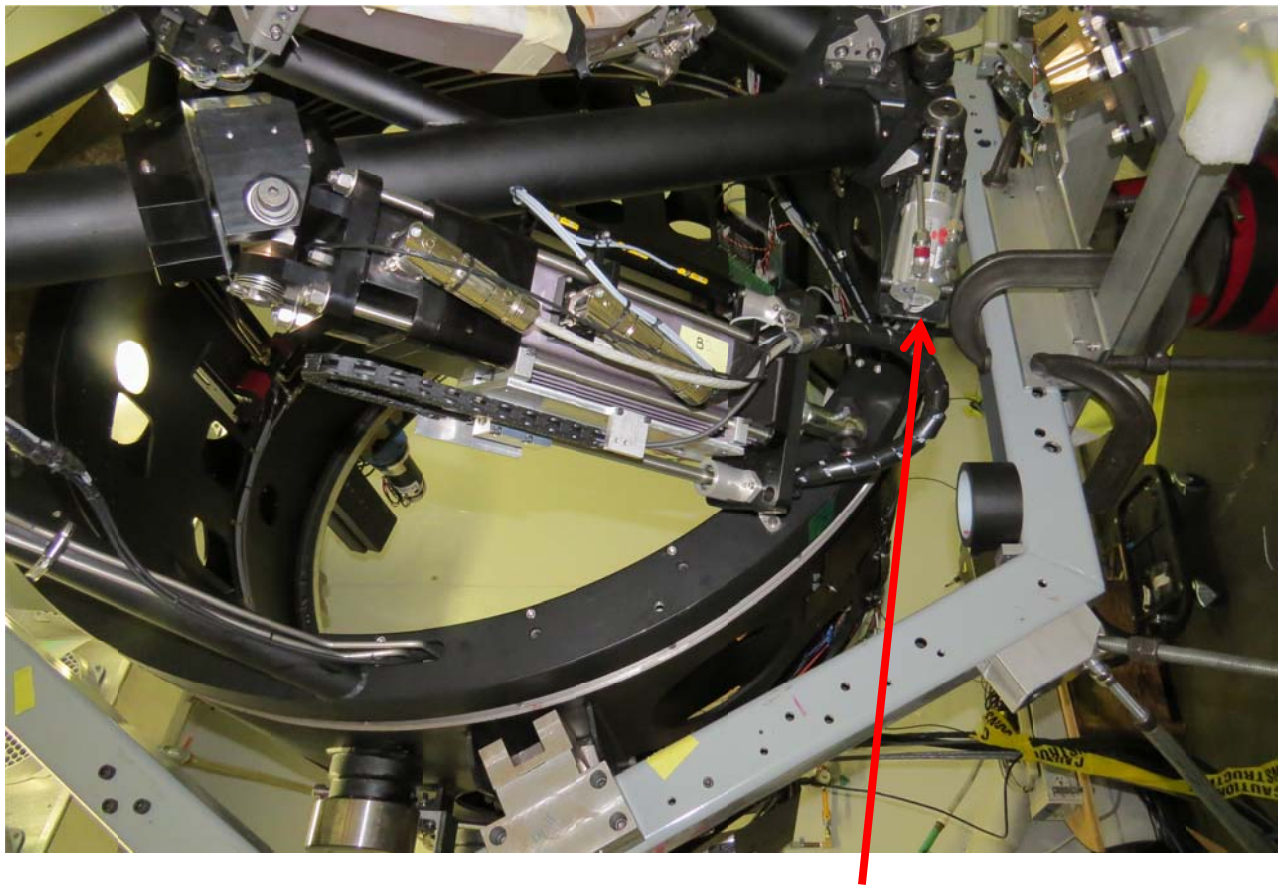


Figure 1: One of Four Destaco Clamps



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### Pneumatic Accessories

13.1



Sensors

#### Features:

- Sensors are activated by a magnetic ring installed on the cylinder piston
- All sensors feature an LED for easy set-up
- IP67 rated
- Temperature Range: -10°C to 60°C [14°F to 140°F]

810169,  
810173,  
810174



8EA-109-1,  
8EA-120-1,  
810170,  
810171



810151,  
810153,  
810155,  
810157



810156,  
810158



810153



#### Sensors Technical Information

Item Number	Mount Style	Connector	Length	Function	Voltage	Max. Switching Current	Voltage Drop
810169	Round	M8 male quick connect	165mm [6.5in.]	Reed	5-120V AC/DC	50mA	3.0V
810173				PNP	4.5-28V DC	100mA	0.5V
810174				NPN	4.5-28V DC	100mA	0.5V
8EA-109-1	T-slot	M8 male quick connect	300mm [11.8in.]	PNP	10-30V DC	100mA	3.0V
8EA-120-1		M12 male quick connect	300mm [11.8in.]	Reed	15-30V DC	500mA	1.5V
810170		M8 male quick connect	165mm [6.5in.]	PNP	10-30V DC	100mA	2.0V
810171	Tie Rod	Nc connector cord	2.7m [9ft.]	NPN	10-30V DC	100mA	2.0V
810151				Reed	5-120V AC/DC	500mA	3.5V
810153				Reed	24-240V AC	4A	1.0V
810155				PNP	6-24V DC	500mA	1.0V
810157				NPN	6-24V DC	500mA	1.0V
810156				Band Clamp			Reed
810158	PNP	6-24V DC	500mA				1.0V



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## Pneumatic Accessories

### Extension Cordsets

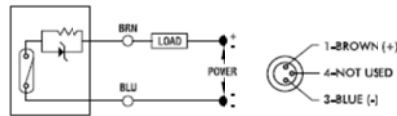
**Features:**

- For use with M8 quick connect sensors
- Threaded coupling nuts provide IP67 protection
- Robotic grade, oil and abrasion resistant polyurethane (PUR) cable

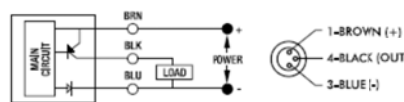
Item Number	Length	Rating	Temperature Rating
<b>CABL-010</b>	2 Meter [78in.]	120V AC/DC, 3A max.	-20°C to 80°C [-40°F to 176°F]
<b>CABL-013</b>	5meter [16.4ft.]		

### Wiring Schematics

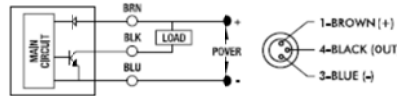
810169



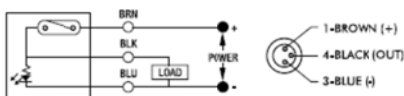
810170, 810173



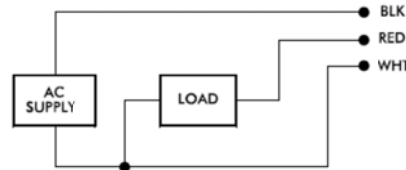
810171, 810174



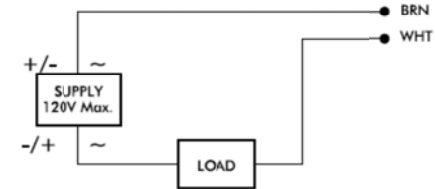
8EA-109-1, 8EA-120-1



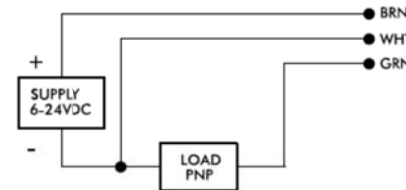
810153



810151, 810156



810155, 810158



810157, 810158

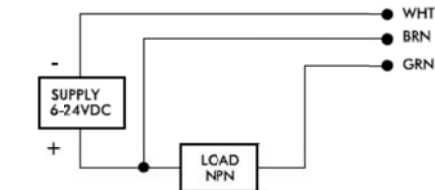


FIGURE 2: 810169 SWITCH SPECIFICATION



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**SETTING THE SWITCH POSTION:**

Below is a procedure to adjust and tighten the magnetic switches. The procedure is mainly from Alex, since he has done it. I added some torque information, since these can be stripped and will not tighten up if stripped. If any of them are stripped, they need to be replaced.

I will also send out a couple of spare switches in case some of them are stripped. If more are needed the spec is attached and the Destaco part number is: 810169.

Procedure from Alex:

Usually I start with the clamps closed assuming the switch is within reach. Assuming that the switch is in the realm of the "popped out location", I would start with

1. Loosen the switch set screw
2. Engage clamp
3. Push/Pull switch until switch reads engaged.
4. Find the limit outside of the engaged signal where the switch no longer reads engaged. (Hard to explain but this is where limit where the switch reads engaged, any further and it might read engaged when it is in the "popped out" regime. You want to find that limit where the clamp is fully over-center. There is actually a decent amount of travel in the de-sta-co between over-center and "popped out") This can be achieved by either pulling on the chord to pull the switch back or pushing with a dull, thin metallic device.
- 4.5(Added by Ratliff 11/5/2018) Move switch 1-2mm toward mid-travel from the limit position where the switch no longer reads activated/engaged.
5. Lock down switch  
(mark the position of the front end of the switch with a fine sharpie)
- 5.5 (Added by Ratliff 11/5/2018) Torque set screw to 1 in-lb
6. Verify no false-positive by pushing down clamp to the popped out location by hand
7. Verify positive reading by engaging via software.

Person that comes to mind at Keck to do this efficiently is Jeremy.

Additional note (from C.Ratliff): do not torque beyond 1 in-lb. It is a small screw and will lock the switch in place if properly torqued and plastic threads are not



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stripped. If threads strip before you get to 1 in-lb, replace switch with one without compromised threads.

I came up with the 1 in-lb experimentally. When I applied 1 in-lb, with a new switch, I was able to apply well over 50 Newtons of tension to the wire and the switch would not move.

To get good access to the flat blade screw with a torque wrench, it might be necessary to remove the two pivot axle screws which are socket head cap screws.

Pavl did the final adjustment on these switches during his last solo trip to Hawaii. He should be consulted to confirm this procedure.

Christopher