

Size 23 Incremental Rotary Actuator

Design Description

Sierra Nevada Corporation's (SNC) Space Systems has designed, developed, and delivered an incremental actuator configured around a Size 23 hybrid stepper motor and a 10:1 planetary gearhead, providing output step resolution of 0.18° per motor step. The Size 23 Rotary Actuator was originally developed and qualified for a solar array drive application but is useful for any open-loop stepper motor driven system that needs fine incremental motion but can tolerate a small amount of backlash.

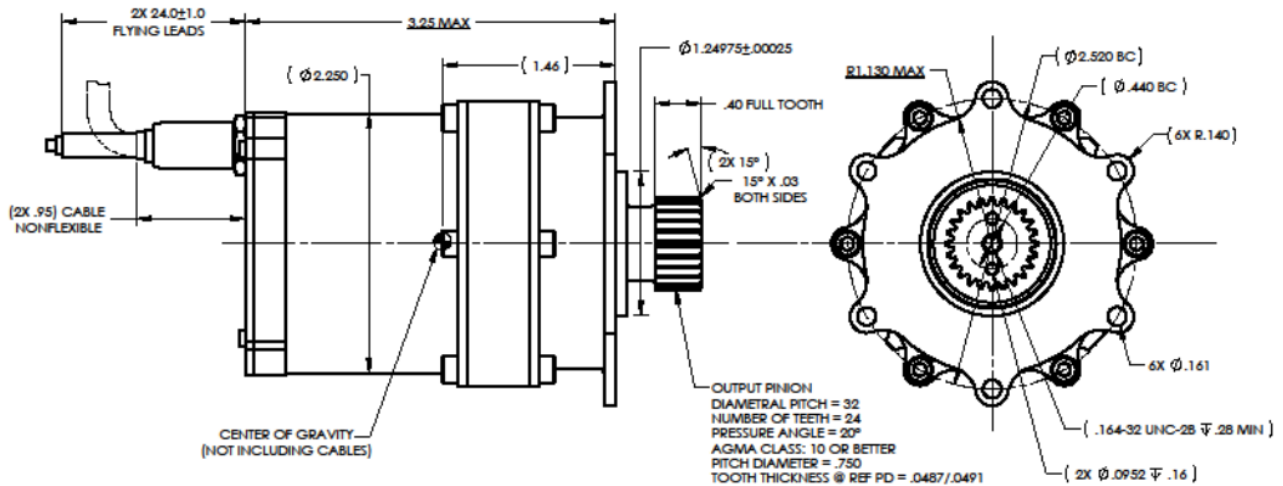
SNC's Size 23 actuator is composed of a 2-phase, bipolar, 1.8-degree hybrid stepper motor with redundant windings that are insulated from one another to prevent failure propagation. The motor is directly coupled to a 10:1 planetary gear reducer which features high strength and low backlash. The motor can be provided without the planetary stage and has a detachable shaft so that it can be mated to a different transmission or used as a direct drive motor. The output shaft can be provided with a spur gear, splined interface or other configuration. The redundant motor leads exit through the rear of the motor in two locations and are continuously shielded from the housing to the ends of the cables.



Size 23 Incremental Rotary Actuator

Features	
• High torque density, 2-phase, 1.8° hybrid stepper motor	• Removable transmission assembly
• Redundant stator windings	• Replaceable motor shaft extension
• 10:1 low-backlash, high strength planetary gear set	• Fully shielded flying lead cabling

Dimensions



Note: All dimensions above are in inches.

Applications	
• Solar array drives	• Antenna gimbals

Heritage Programs	
• Qualified but not yet flown for a SADA application	

Product Specifications		
	U.S.	SI
Mechanical		
Actuator size (OD x L)	Ø2.8 in x 4.5 in	Ø71.1 mm x 114.3 mm
Actuator mass	2.0 lb	0.9 kg
Motor mass	1.3 lb	0.6 kg
Output Torque, maximum	58.0 in-lb	6.6 Nm
Step size	0.18° with gearhead, 1.8° without gearing	
Backlash	0.2° typical, 0.4° max.	
Electrical		
Motor type	2-phase, bipolar, redundant, 1.8° stepper	
Voltage, nominal	28 Vdc	
Resistance (at ambient temperature)	120 Ω	
Driver type	2-phase, bipolar (or 4-phase unipolar with reduced torque)	
Qualified Environments		
Random vibration	10.5 grms; 180 s / axis	
Sine vibration	13.0 g; 2 octaves / min / axis	
Pyrotechnic shock	1,865 g; 3 events / axis	
Temperature, operating	-4 °F to +176 °F	-20 °C to +80 °C
Temperature, survival	-40 °F to 185 °F	-40 °C to +85 °C
Note: This data is for information only and subject to change. Contact SNC's Space Systems, Space Technologies for design data.		

